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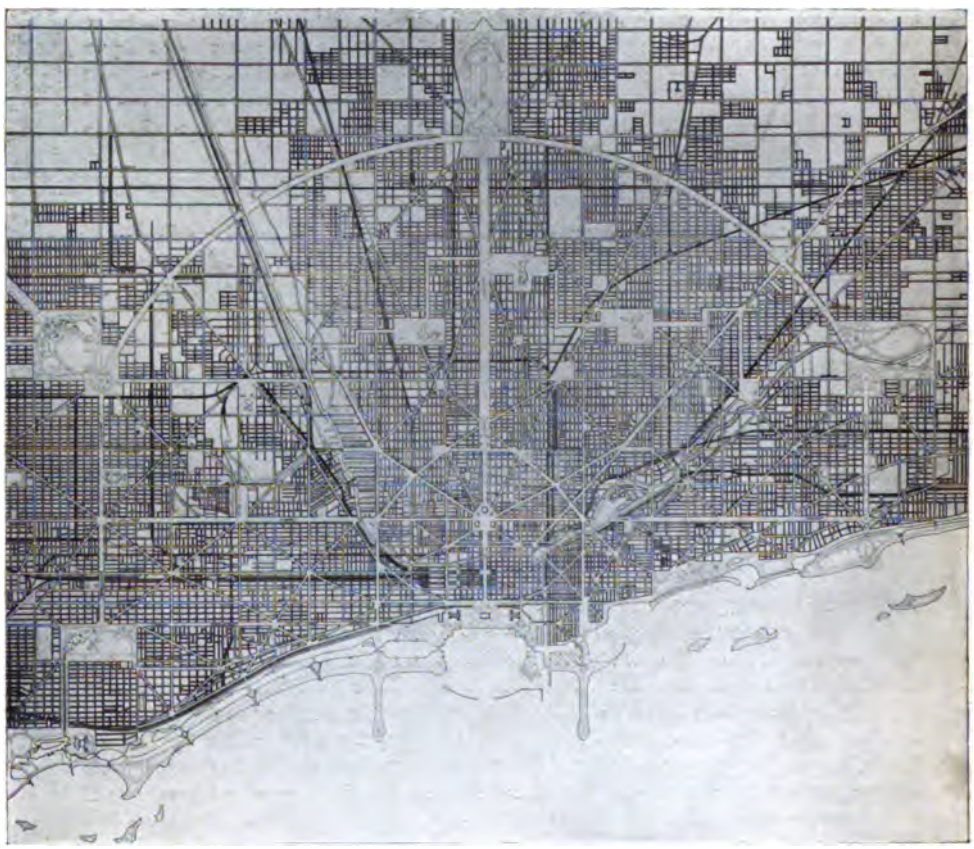

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CHICAGO. PLAN OF THE STREET BOULEVARD. PARK SYSTEMS, PRESENT AND PROPOSED.

The Relations of Railways to City Development.

THURSDAY MORNING SESSION.

DECEMBER 16, 1909.

The Convention convened at 10 o'clock A. M., Mr. Cass Gilbert, President, in the Chair.

The President: The principal topic of discussion, as you notice by the programme, may be roughly stated to relate to railroad buildings, railroad development, and the relation of that development to national and civic life. I will not anticipate what may be the point of view of any speaker by attempting to express my own views as to the subject under discussion, but will follow the custom of very simply introducing the speaker on each topic, and you then shall hear what he has to say much better than I could possibly say it.

I will ask Mr. Irving K. Pond to escort Mr. Delano to the platform.

Mr. Delano was escorted to the platform by Mr. Irving K. Pond.

The President: I have very great pleasure in introducing to you Mr. Frederic A. Delano, of Chicago, President of the Wabash Railroad. [Applause.]

RAILWAY TERMINALS AND THEIR RELATION TO CITY PLANNING.

MR. FREDERIC A. DELANO,
President of the Wabash Railroad Company.

THE GENERAL PROBLEM.

Not only is the problem of terminal facilities for the railroads in our large cities becoming very complex in itself, but it is evident that it cannot be disassociated from the problem of housing, of "intramural" transportation, or of laying out the

cities' arteries, breathing spots, or their main centers of activity. All of these functions must be considered together and co-ordinated in order to get intelligent and satisfactory results. The extraordinary growth in recent years of cities in the Old World, as well as in the new, has naturally been the cause of much wonder, comment and analysis.

In the United States, at least, it has been found impossible by the railroads to plan for future needs more than twenty or twenty-five years in advance, under the most favorable circumstances, and in many cases, projects for extensions and improvements that were thought, when planned, to provide for traffic so far ahead as to be extravagant, have soon proved to be inadequate.

CONDITION AFFECTING THE PLAN OF CITIES.

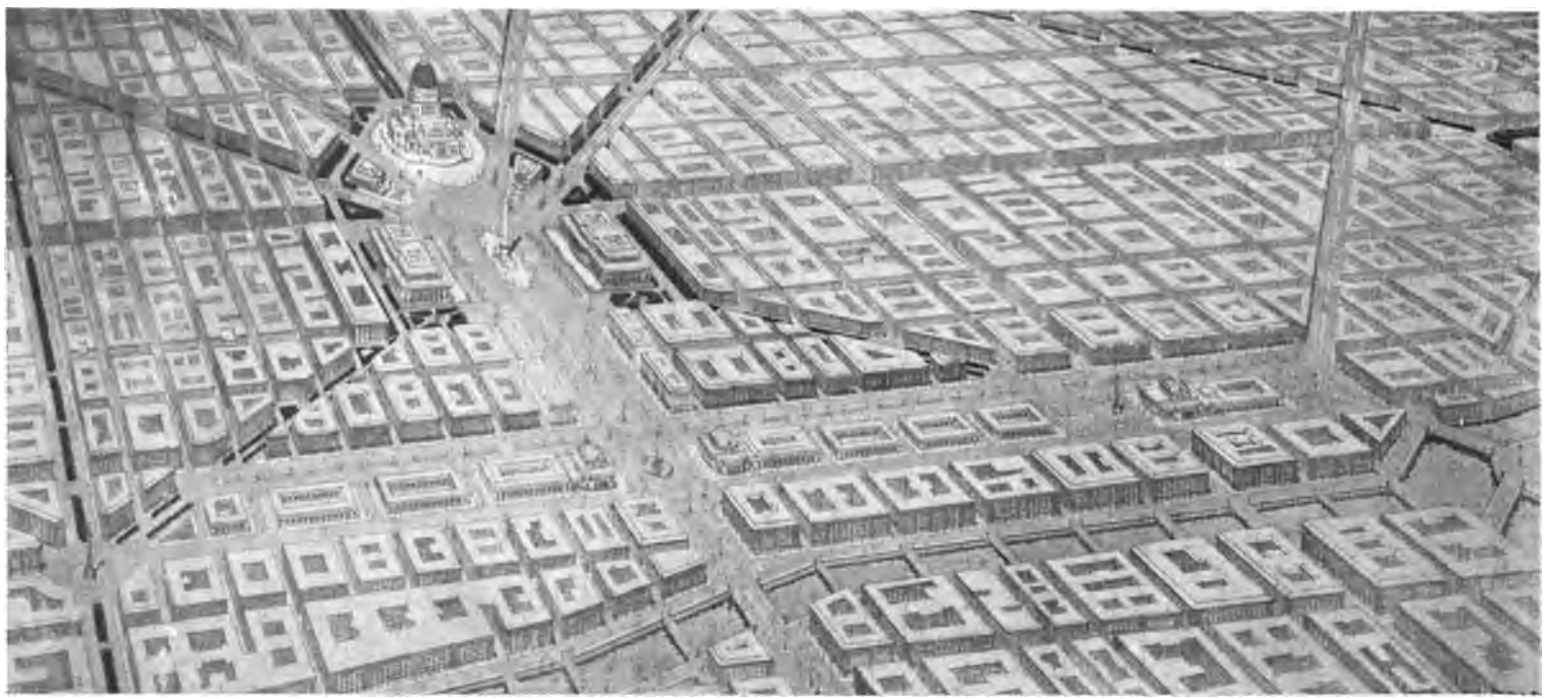
a. Geographical and Topographical Conditions.—The general plan of cities is, obviously, chiefly controlled by geographical and topographical conditions: they may, for convenience, be divided into three typical groups:

1. New York (Manhattan Borough) is a type of city whose development and growth have been forced into certain hard and fast lines by the fact that it is built on a long and comparatively narrow strip of land between two great rivers.

2. Pittsburgh is an example of a second type, being located on hills divided by deep and comparatively narrow river valleys. In such cases, of course, railroad entrance to the city is almost necessarily forced into the valleys, and the development must be adapted to the geographical as well as the topographical conditions.

3. Chicago, Detroit and Buffalo are good examples of a third type, in which the city has first developed along a large body of water and then grown in concentric circles back from the water, the topography being so nearly flat as neither to suggest nor to interfere with any particular plan. In the case of Chicago, the river presents some special problems and obstacles to natural growth; but, generally speaking, this type of city develops on the plan of an opened fan.

b. Effect of the Height of Buildings.—Although we hear much of the advisability of city ordinances limiting the height of buildings, the ordinances of one administration are likely to be disregarded or repealed by the next, and it may be said, speaking generally, that in this country we have not been successful in fixing any limit to the height of buildings; Boston being a notable exception, I am told, and there it is regulated by some legislative enactment. [Applause.] Many of our large office and store buildings accommodate 10,000 people; and it is said of a large retail store in Chicago, which occupies not quite an entire city block and has a height of only twelve stories, that it frequently happens that there are 25,000 people in this store at one time. If the so-called "Loop District" or business heart of Chicago were filled with twenty-story buildings, a condition which seems to be fast approaching, we should have say forty blocks, each accommodating 25,000 people. For that district alone, then, one mile in length and half a mile in width, our planning for streets and intramural transportation facilities must make provision for the daily incoming



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CHICAGO. RAILWAY STATION SCHEME WEST OF THE RIVER, SHOWING RELATION TO THE CIVIC CENTER.

and outgoing of about 1,000,000 people, besides which an equal number will have to be cared for in the "fringe" of surrounding territory.

It is obvious that the magnitude of the problem is very great and that every transportation facility, underground, on the street level, and overhead, will soon be taxed to its utmost. In cities of special type, such as New York, various centers develop and the movement of people in and out of the shopping district interferes in a much less degree with the movement in and out of the wholesale district or to and from office buildings. In New York, however, there are not enough arteries in the axial line of its development to supply the constantly and rapidly growing needs, and we can now see that the street plan of that city was wrong; the north and south arteries should have been close together, while the east and west streets might better have been far apart.

c. Effect of the Housing Problem.—It may be said, generally speaking, that the radius within which the worker in a city may live is determined almost wholly by the time it takes him to travel to and from his daily occupation, and the cost of the transportation. An overwhelming majority of the people must live within a half to three-quarters of an hour of their work and will not pay a fare exceeding ten cents, morning and night. Hence it follows that the quicker and more economical the transportation, the greater will be the radius of country open for the development of homes.

THE RELATION OF THE RAILWAY TERMINAL TO CITY DEVELOPMENT.

The healthy growth of our cities is, then, dependent upon the concurrent growth of adequate transportation facilities, and the time is rapidly approaching when there will be practically no real homes within our big cities proper; there are apartments, flats and tenements a-plenty but no real homes, except in the surrounding fringe. In New York's East Side there is a teeming population employed in and about their own tenements, but of the hundreds of thousands who daily go to and from their work in lower Manhattan, the business district proper, it is probably safe to assume that three out of four live outside of the Island, while in Boston the percentage of workers in the city proper who live in the surrounding fringe is much larger because of the greater adequacy of its suburban service.

In small cities and in many of considerable size, it is desirable that the railway trains shall deposit their passengers close to the business center of the city; in most cities of the United States of under 100,000 inhabitants this is probably true; but even so, it is well to bear in mind that the city of 100,000 to-day which has its most valuable property occupied by passenger terminals will regret the adverse occupation of this land when it has doubled or quadrupled in size! While in cities of the Old World, which were already great before the railroads were created, and in our larger cities in this country, it is no longer possible and, to my mind, it is highly undesirable. The reason for this conclusion is that the railway terminal in a large city, if it is to be adequate to the needs, takes up directly and indirectly an immense

amount of space, requires the closing of streets, and thus greatly interferes with the growth and development of a city. Indeed, a railroad both as an artery of traffic and as an obstacle should be viewed like a great river or broad canal, for while it can be passed over and under more readily than a river, it necessarily forms a very important obstacle to any growth or development.

Railway terminal facilities in a city may be analyzed, in a general way, as follows:

I. Passenger terminals.
   (*a*) For suburban passengers.
   (*b*) For through passengers.

II. Freight terminals.
   (*a*) For high class packages of less than carload freight which is now, generally speaking, trucked through our city streets.
   (*b*) For the more important carload freight which is also, to a very large extent, trucked through our city streets, or to some extent handled directly from car to warehouse.
   (*c*) The coarser articles; like coal, brick, stone, sand, structural steel, lumber, and miscellaneous building materials, which need not necessarily be handled in the heart of the city and which are usually distributed from yards conveniently located about the city.

The public very naturally considers the passenger terminal of a railroad as the all-important matter. A comparatively small percentage of the population of our big cities know much about the freight facilities of the railroads and yet, since from two-thirds to three-quarters of the earnings of railroads are developed from freight business, and practically all our supplies of all kinds, including our daily food, are transported by freight, that branch of the service is of most vital importance. Beyond question, the planning of adequate and proper freight facilities in our large cities is not only more difficult but also of more real importance to the life, health and comfort of everyone living in or visiting the city than the location or plan of the passenger facilities. In a city of 100,000 inhabitants or less, it is to be expected that the railway shall deposit its passengers within say one-quarter of a mile of the business center of the city. This means, for a great majority of the people, stations within easy and comfortable walking distance of the seat of business of the city, but in our very large cities it is practically impossible, not to say undesirable, that such a condition of affairs should exist. If it were possible to separate the suburban, or short-haul travel, from the "through" or long-haul travel, it would be desirable to let the suburban passengers be carried into and through the regular channels or arteries of the intramural scheme of transportation. The kind of metropolitan station which is desirable and necessary for the *long-distance* business, is neither desirable nor necessary for the suburban service. A Chicago critic, writing recently on this subject, has suggested that trunk line railways should have no terminals in large cities and that the trains should pass directly through, having in mind, evidently, that in Chicago, for instance, trains from New York should simply stop

at the main station and then pass through on their way to some other point. Aside from the physical difficulties of creating a system like this in a big city where it has not already been provided for, there seem to be few advantages in such an arrangement. An analysis of the character of the business done on a "through" train arriving at a city like Chicago would probably show that a very large majority of people arriving were not going beyond the city—or, at least, not immediately. By stopping a train arriving from New York for only a moment at the main station in Chicago and then sending it on—say toward Omaha—a very small percentage of people who desire to move on directly to some city further west might be accommodated, but it would be decidedly inconvenient to the Chicago passengers who wished to go to Omaha. In other words, if it were only necessary for a train to remain in the station a few moments to take on passengers with their baggage and bundles, there would be very little necessity for large or commodious passenger stations. The necessity for a large number of tracks in our stations is due not only to the number of trains handled, but to the length of time required for trains to remain in the station for the accommodation of passengers. Admittedly, it does not take very long to discharge passengers from a long train, nor so very long to take off the baggage and mail, but at least half an hour is usually allowed for the convenience of passengers to permit them to board and get comfortably settled in the train preparatory to a long journey. If it were feasible for railroads to run directly through the center of a city and have their yards and terminal facilities on comparatively cheap property on the farther side of the city limits there would be quite a large economy in respect to the amount of property required for a downtown terminal, but I question whether such an arrangement would be at all satisfactory to the public. To make the most important station in a large city simply a way station where trains should stop, say not to exceed five minutes, would not, I am afraid, satisfy public needs; and I believe that the suggestions in this respect grow out of a confusion of ideas between public requirements for suburban travel and those for through travel. I have said enough, I believe, to show that there are wholly different conditions existing in the two cases. The suburban passenger should, if possible, reach his business destination without being required to transfer to another system of transportation, but this is neither required nor particularly desirable in the case of the long-distance traveler. The latter usually wishes to go to his home or his hotel before proceeding to his work.

FREIGHT TERMINALS.

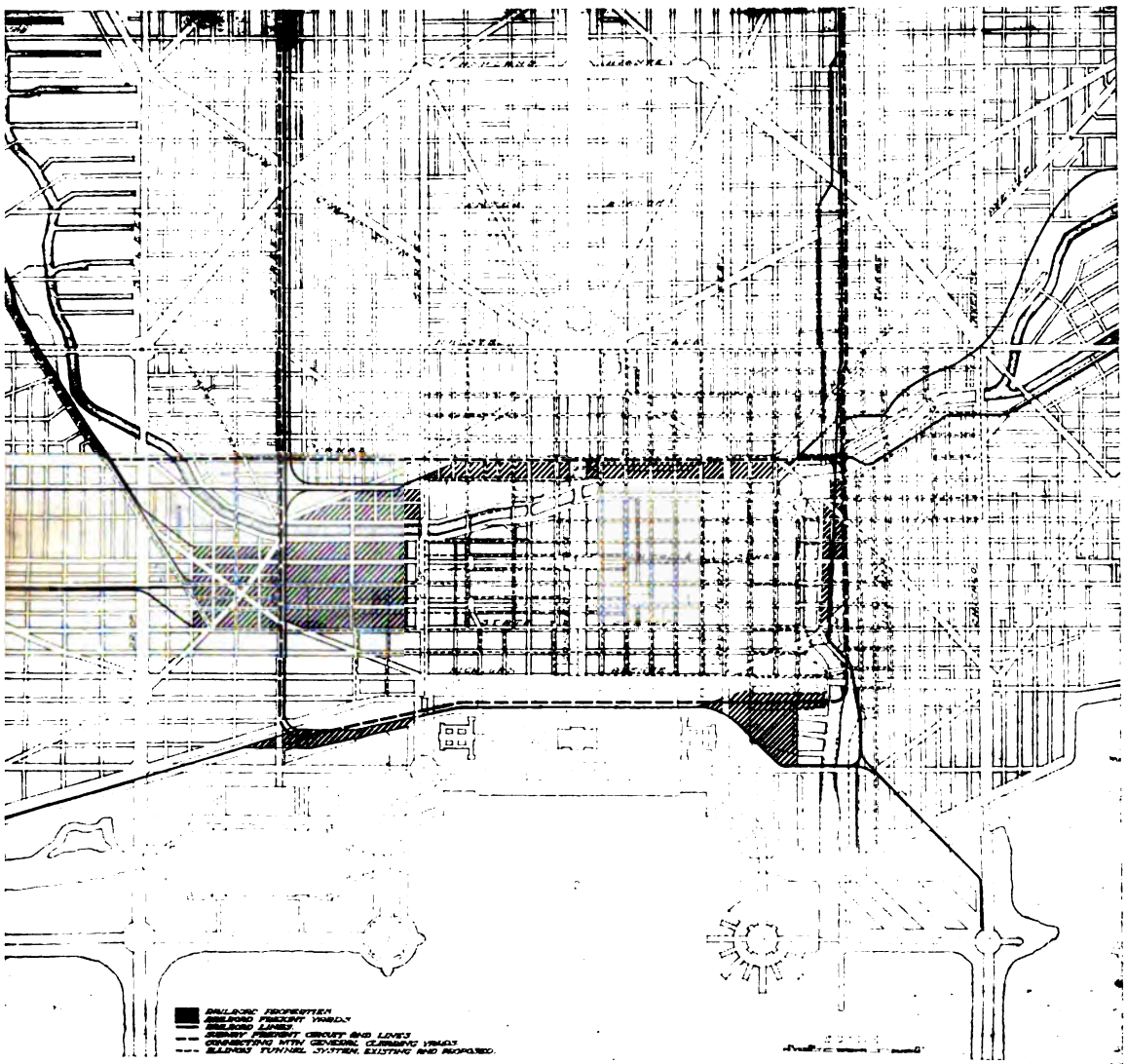
As has already been said, the difficulties in planning freight terminals are much greater than with passenger terminals and there is obviously room for immense improvement and development in this direction. The old-fashioned method of handling freight from wagons across a covered platform to be loaded into cars—now almost universally in use—is satisfactory in towns and cities of moderate size; but in our large cities, where the congestion of street service is very great, causing constant detentions; where the cost of teaming, due to high wages, is excessive;

and where, on account of the fact that to make freight facilities adequate, freight houses must be made very long, the cost of trucking the freight by hand, and the time wasted are both excessive. This constitutes, to say the least, a very difficult condition to contend with and one for which the remedy can only be found by a very thorough and comprehensive scheme of development. It sometimes seems strange to the writer that the first development of our tunnel facilities for transportation in cities should have been for the carriage of passengers. What if we had built our subways first to relieve the surface of the streets of all the slow-moving traffic and had reserved the surface of the streets for our own use? Certainly light and fresh air are more necessary for human comfort than for the handling of goods!

Because freight is not self-propelling, the cost of gathering and distributing it in a large city is an enormous item. As a result of economic conditions in this country, wages are increasing rapidly and the unit of human efficiency without the aid of machinery is diminishing at the same time. The cost of all work largely dependent on manual labor has increased in the last twenty years so much that every business man is constantly seeking for some sort of labor-saving device to stem the tide; incidentally, it may be remarked that the greatest stimulus to mechanical invention in this country is thus the steadily and constantly rising rate of wages.

These economic conditions have resulted in damage alike to railways and shippers, because no mechanical devices have been found to offset the immense increase in labor cost. All admit that the methods are crude—no better than they were fifty years ago—while not nearly so cheap. How to solve the problem is the question before us.

The passenger station problem where many railways are to be dealt with is difficult, but the freight problem is, by comparison, stupendous. Take the case of Chicago, for example—six passenger stations are handling the twenty-three separate trunk lines (four of which have more than one line into the city), but when it comes to freight depots, each of these twenty-three lines has at least one downtown depot for receiving and forwarding of freight, with from three to ten subsidiary stations further from the heart of the city to supplement the main station. It is safe to say that the value of the ground utilized by these downtown freight stations and the tracks serving them is not less than twenty-five millions of dollars—I really believe it is double that—but that is not all; if these facilities accomplished what they were designed to accomplish, economically and satisfactorily either for the transportation company or the shippers, it might be money well spent, but the truth is that this is only partially true. Furthermore, the shipper, instead of getting the full advantage of having a plurality of lines to ship over, is at added expense as compared with the shipper in a small town with only one or two railways. In the latter case, the shipper may load his wagon with freight for any destination in the shippers' guide and leave it to the railway company to sort it out and select the appropriate routes; but in the large city of Chicago he has to divide his truck load according to the number of roads for which he has packages, for each railway station is restricted to the carriage of freight reached by its lines. It is for this



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IICAGO. DIAGRAM SHOWING LOCATION EXISTING FREIGHT YARDS AND RAILROAD LINES, PRESENT TUNNEL AND PROPOSED CIRCUIT AND ALL CONNECTIONS TO CENTRAL CLEARING YARDS.

reason that the shippers say we need Union Freight Stations more than we need Union Passenger Stations. Passengers can walk or ride, and know how and where they want to go, but freight must be trundled through our streets, and hence means must be found so that it shall be disposed of with the minimum of expense and handling.

Having this problem in mind, the writer ventures something more than a criticism: to-wit, a suggestion. Because it seems essential that we seek to relieve the congestion near the city's heart, it seems evident that we should try to move the freight out toward the less densely settled portions of the city and there, where the ground is to be had on reasonable terms, create facilities for the economical loading of trains of cars in proper order and rotation. The ideal way of doing this would be for the municipality to furnish a tunnel or subway under the streets bisecting the wholesale business district. This freight subway should be provided with a platform or conveyor moving intermittently, or else continuously, at slow speed, having at intervals of say two to four blocks small stations for the receipt of freight. The freight, duly receipted for by authorized agents, would be loaded on the conveyor, where it would remain until delivered and unloaded in a large, commodious, well-arranged house for the distribution and loading of freight. The conveyor, as already described, should be arranged to move in a subway loop through the heart of the city, but emerging from that and along some railway right of way to a convenient depot or clearing house for loading of freight.

A less complete scheme would be one in which each of the combinations of lines already inter-associated in passenger terminal arrangements should create their own subway loops, thus joining the downtown freight depots in a chain, greatly relieving the existing congestion by carrying the freight out where good facilities might easily be created. Such a subway conveyor scheme is readily applicable to the outward-moving business of the city, but admittedly less applicable to the inward-moving business. Even if only the outward-bound business were thus provided for, there would be a great advantage and relief from the congestion due to trucking freight through downtown streets.

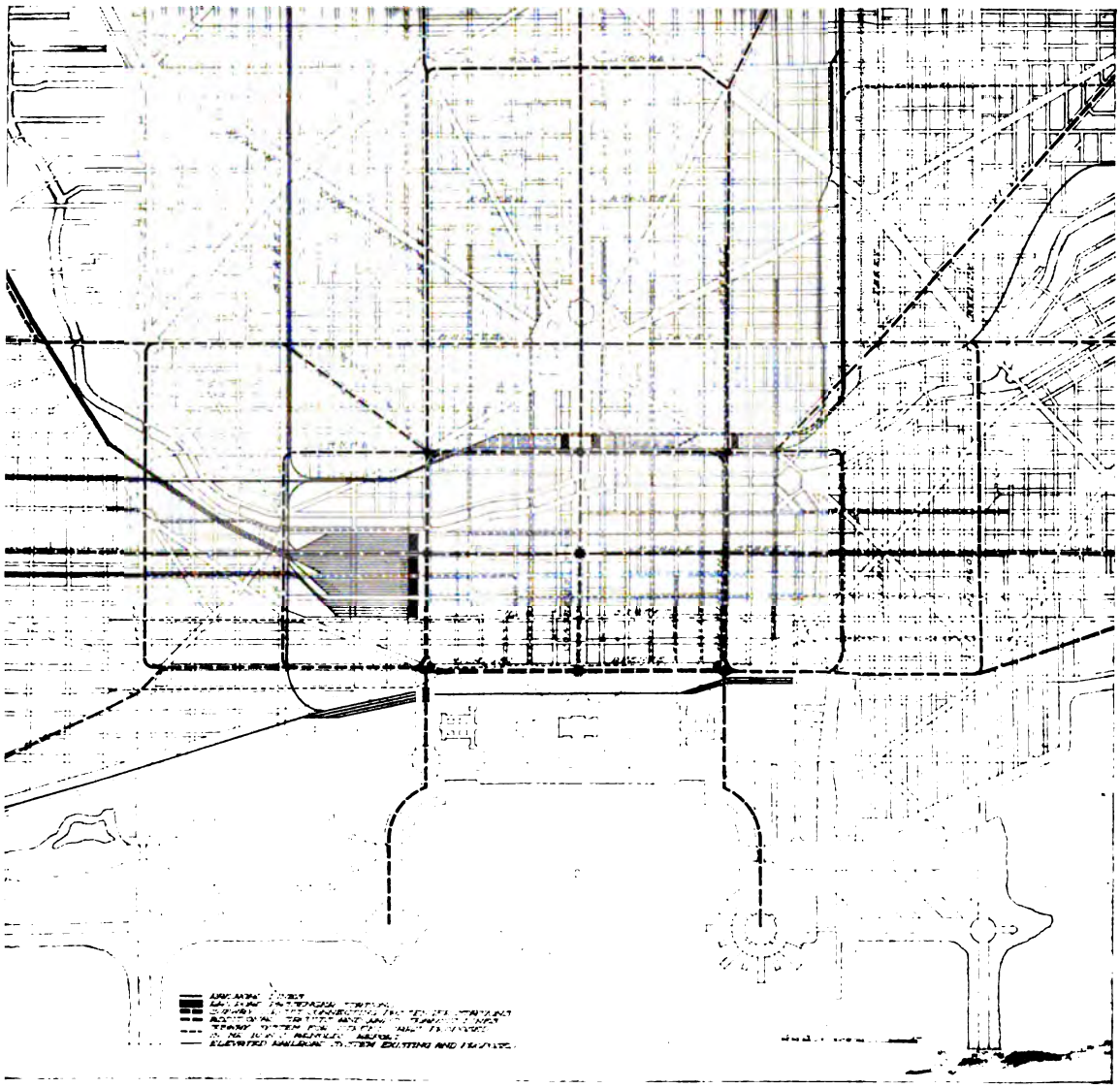
Mr. Burnham, in his admirable Plan of Chicago, has shown the relations of the various traffic loops to each other, indicating in a diagrammatic way how they may be developed and co-ordinated one with the other and with a scheme for sorting and interchange outside the city.

It may be truly said that all these details are "as dry as dust" and yet, pray remember that they have an important bearing on city planning. We know that high buildings were impossible without the modern American elevator; that high buildings made high land values, put new demands on transportation, and finally created such congestion on city streets as to make it incumbent on all concerned to do their part to relieve the streets of all that can be taken off them. How shall this be done? Shall we begin by compelling suffering humanity to go underground, or shall we begin by sending the freight in that way and postpone the necessity for human *burrowing* as long as possible? Of course, it is recognized that rapid

transit on city streets with cross currents of traffic at every block is not safe or even possible, but let us begin by relieving the street surface first, then by intelligent traffic rules let us so segregate the surface traffic that it shall move with a minimum of interruption.

LOCATION OF PASSENGER TERMINALS FOR THROUGH TRAFFIC.

Enough has been said to indicate that the writer believes the freight terminal problem in our large cities is even more important and more difficult than the passenger problem. But naturally enough at this time and place, you wish to hear particularly of the passenger terminal problem. Admitting, if you will, that the suburban passenger requires no elaborate terminal; that he would prefer a system of transportation which would give him an option of getting off at any one of several stations within the heart of the city; such service, for example, as the elevated roads or subways and surface lines give in our larger cities—the terminal for handling through traffic becomes the paramount consideration. The facts that people as a rule travel more than they used to; that long journeys are very common; that the comforts of travel require handling of very long trains; that a modern passenger depot must be supplied with many collateral conveniences, are all tending to increase the difficulties of the problem. An analysis of the travel will usually show that by far the greater proportion of the users of long-distance trains are the "well-to-do" people who live in widely scattered districts, so that it is sometimes a mistake to assume that the passenger terminal must be central to the center of the population. A more correct statement would be that it should be near the *center of convenience* for the principal users. What the center of convenience is, is a matter of some difficulty to determine. To a very large portion of the transient visitors, the conveniently located passenger depot center would bear some relation to the natural or convenient hotel and theatre center; to accommodate another large proportion of the traveling public it might be said that it should be conveniently related to the residence districts which are usually widely separated. But in no one of these three cases is it to be expected or necessary that the passenger arriving by train from a long journey or departing on a long journey expects to do so without taking some conveyance, and an analysis of the business will usually show that the large number of passengers arriving and departing on through trains use surface, elevated or subway cars, cabs, busses, automobiles, or other conveyances. The important question is not that it shall be within walking distance but that it shall be conveniently related to these various means of intramural transportation. It has already been noted that every new facility of transportation, every quickening of speed by annihilation of distance increases the possible radius of distribution of the homes of the people whose whole career is directly connected with the city, even though they may not live within its corporate limits. Thus the automobile, even though it furnishes an expensive and perhaps extravagant means of transportation, is having a very influential effect in this direction. Indeed, one cannot study this problem



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HICAGO. DIAGRAM SHOWING THE PROPOSED ARRANGEMENT OF RAILWAY PASSENGER SEATIONS, TRACTION SYSTEM, ELEVATED AND SUBWAY ROADS.

without being impressed with the inter-dependence of through traffic terminals and intramural transportation facilities. It is certainly true that if we settle the one without regard to the other, we are adopting a short-sighted policy. The evils of this method are to be seen where it has been pursued.

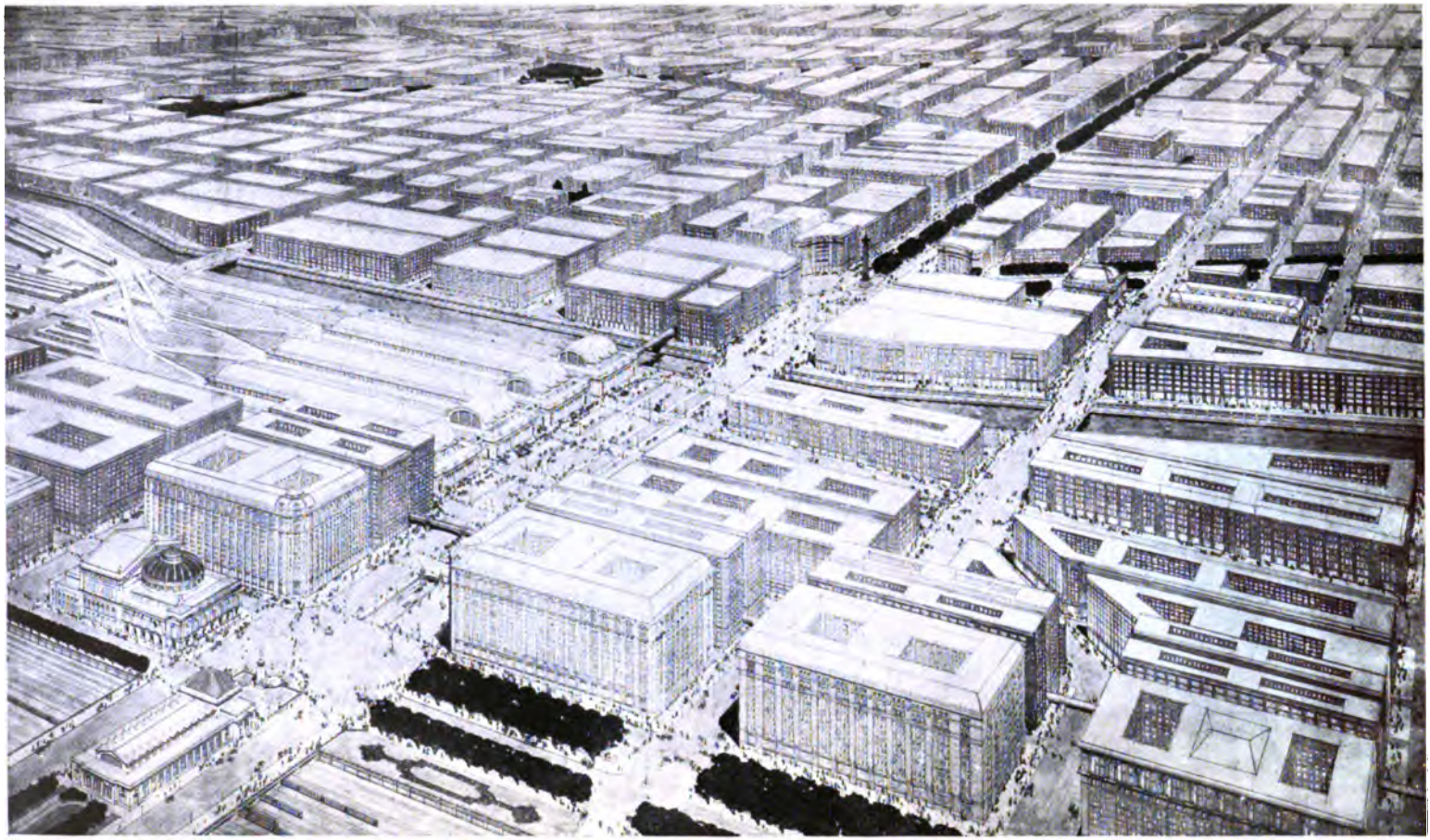
The location of a Union Station or groups of stations obviously becomes increasingly more difficult with the number of railroads to be dealt with. In Chicago it is an interesting problem because there twenty-three railway systems have their termini, of which systems three represent two, and one, three different lines entering the city. We, accordingly, have in Chicago a problem of determining and locating a passenger terminal for lines radiating in twenty-eight different directions; as the approaches to Chicago are very flat, many of these lines cross and recross each other, making a network which is indeed a tangled skein. To make a complete and ideal readjustment of all these lines cannot be undertaken because it would involve too great a destruction of vested interests, but a readjustment and simplification so far as the city terminals alone are concerned is both feasible and desirable. The writer made some suggestions along these lines some five years ago, and thanks to the assistance of Mr. Burnham and others, these suggestions have been taken up and, with some modifications, have had the approval of important interests, though there still remains much to be done before the scheme can be consummated. Those of you who have seen Mr. Burnham's Plan of Chicago doubtless know in a general way what that plan is in its relation to the railroads. It contemplates making a series of Union Depots, three to six in number, along a broad avenue to be created on 12th Street; the most important east and west thoroughfare between Harrison Street on the north and 18th Street on the south—a distance of more than a mile. Along the axis of Canal Street and between Van Buren and Madison Streets, it is proposed to locate one or two other groups of stations so that the final arrangement as contemplated by Mr. Burnham's plan would enable a single encircling avenue of traffic—12th Street east and west, and Canal Street north and south—to reach the passenger terminals of the entire city. The phrase "avenue of traffic" has been used advisedly with the thought that it should be not simply a boulevard for light vehicle traffic, but an avenue on which electric cars, traffic trucks and other vehicles could move. In this general plan, due consideration has been given to the freight traffic, for who could live in Chicago and ignore it?

It may be argued that the companies or groups of companies that have a relative advantage as compared with their neighbors will never agree to such a plan, and it has been urged frequently that those who have charge of these great railway properties owe a duty to their stockholders not to yield any advantage they have. While this may be admissible reasoning, it is also true that not a single one of these companies (with the possible exception of the Chicago & Northwestern, which is in the midst of making very extensive improvements) has all that it requires; and that there is not one of these companies or groups of companies which doesn't require some added facilities, either passenger or freight. A complete study of the whole problem in every case will, it is believed by the writer, convince all that no

final plan can be worked out which does not consider coordination of the city or intramural transportation facilities with the railway terminals. As has been well said, the railway terminus of through traffic has become the modern *portal* of a great city. Through it are passing, in and out, the citizens of the city as they come and go on their journeys, but what is perhaps almost as important, through it are passing our visitors who frequently get their first and last impression of the city from this railway terminus and its immediate surroundings. Those of us who live in Chicago realize that much adverse criticism has come from those whose only impressions have been made by their journeys from the railroad station to their hotels or business engagements—bad impressions which it has taken many favorable impressions to overcome. In some respects, the problem in Chicago is very difficult; in other respects, and especially when considering the number of units involved, it is remarkably simple. In more ways than one, however, it is just the same sort of problem that faces many other cities. It is a problem which cannot fail to appeal to the imagination of any man and is surely worthy of the deepest study of the best minds among architects, engineers and statesmen, as well as railway men. [Applause.]

The President: I would state to members of the Convention who wish to informally discuss the suggestions made by Mr. Delano in his most admirable paper, that their remarks would be appropriate at this time.

Mr. Kelsey: The very admirable paper we have just listened to has been full of absolutely new thoughts and instructive ideas to me, but there was one statement made by Mr. Delano which I agree with, but perhaps not in the way he meant. He stated that the plan of New York, as originally laid out, was wrong. We all realize that the plan of New York can be very much improved, and could have been very much improved, but in discussing the ebb and flow of various kinds of traffic he may have lost sight of the fact that when the city was first designed the traffic movement was from east to west, and therefore at that time the great arteries were needed from east to west. Then, during the past hundred years, of course, the traffic has developed from north to south, but the curious thing is, and I am told by one or two people who have looked into the matter more than I have, that now, since the building of the tunnels and the bridges, the pendulum is swinging back again and that the volume of traffic to New Jersey and Long Island is equal to the traffic north and south, showing that it seems to be absolutely impossible for any people at any epoch to design a city which will meet the traffic demands of the future.



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CHICAGO. PROPOSED TWELFTH STREET BOULEVARD. RAILWAY TERMINALS ON BOULEVARD. WEST SIDE RAILWAY STATIONS.

Mr. Elzner: I would like to suggest one question and that is this: In the cities of average size, is it more economical for the railways to handle their cars and trains in central stations or in stations located in different parts of the city, rather than at the outskirts—I should say the average city, one of from 300,000 to 500,000?

Mr. Delano: In answer to the first speaker, I realize that it is dangerous for a man from Chicago to suggest that there is anything wrong in New York. [Laughter.] My only excuse for that is that I came from New York State myself, and I have a great deal of fondness for New York. Many of my people live in New York city still. I did not mean to say that our forefathers in New York could have foreseen the changed requirements, and yet I cannot believe that the growth of traffic from New Jersey and from Brooklyn to New York is going to change the requirements in respect of the north and south movement of traffic. The traffic from those cities is arriving at New York either in tunnels or by bridges, and is helping to congest the north and south arteries. One difficulty in any north and south traffic movement in New York is that the crossing traffic is so frequent that there cannot be any rapid transit except by elevated roads or subways, which entirely eliminates the grade crossings. If the north and south streets had been twice as frequent and the east and west streets only half as frequent, that condition would have been bettered, but, as I said before, I did not mean to say that in a fault-finding way at all. Nobody could have foreseen two hundred or three hundred years ago what New York has developed into and, in fact, as I look back to my early days in New York, I remember when the Grand Central Station was built; I remember of that upper part of New York nobody could have imagined that it would be built up with great high buildings as it has been.

Answering the other question, about smaller towns, if these cities which have from 300,000 to 500,000 inhabitants (and I think they are mighty nice cities), would be content to stay where they are [Laughter], they would be pleasanter to live in, and railway problems and the city planning problem and a lot of other problems would be greatly simplified; but the city of 300,000 to 500,000 wants to be a city of a million, and the city of a million wants to be two millions, and so on.

This paper of mine, I recognize, is full of defects. When any one

attempts to generalize on problems which are as complex as this, he is certain to raise in the minds of his hearers many difficulties and obstacles. The hearer thinks of a concrete problem, which the generalization does not fit at all. The only value of this paper lies in the fact that it is intended to set you thinking on some of the difficulties, and the whole idea of it is that there cannot be a solution of these problems unless the different interests cooperate and coordinate their work. [Applause.]

There is another city that I am very fond of and go to pretty often—Boston, and I do not know whether our friends of Boston are as sensitive as those from New York. [Laughter.]

The President: The question as to New York was raised by a Philadelphia man. [Laughter.] Philadelphia is nervous about New York. [Laughter.]

Mr. Delano: In developing the subway system of Boston there has been an entire disregard in routing of the lines to the great railway terminals of that city. The consequence is that if you want to go, as I often do, to South Station from different parts of Boston, you give up any idea of going there by cars, a thankless operation, and take a cab. There may have been an equal disregard on the part of the railway men in planting their stations where they did—I do not hold a brief for them, and I think they may be just as much to blame—but there is no doubt in my mind that the two interests and the great public, which is the important third interest, should get together. [Applause.]

Mr. Coolidge: If it be in order, since Boston has been alluded to, I should be very glad to put the case before Mr. Delano for a matter of general criticism.

A committee on city planning—a committee of the Chamber of Commerce—is considering the possibility of a development of passenger traffic across Boston on somewhat the following lines: That all trains going south from Boston should leave the North Station and cross the city in a subway, stopping two or three times, and then go southward; conversely all trains going north from Boston should start from its south station, its south terminal, and go northward, stopping two or three times through the city in the subway and thence go northward. The advantage of that seems to be that long-distance trains are made up at the terminal where they can wait, as Mr. Delano indicated, a half

an hour or more for their passengers, and yet can take on in the course of their journey through the city, at two or three different points, passengers who find it more convenient to get on there. It seems to me, such a system, which is feasible in Boston, and I think will soon be studied, will give the advantage of a thoroughly rational distribution of passenger traffic, both at starting and at arriving, and would bring the local and terminal stations for the longer lines together in the same spots—I say together, meaning at two terminals, one north and one south of the city, very much more convenient, as we think, than a centralized terminal on much more expensive lands. I wish Mr. Delano would discuss that possibility: all south-going trains to start from the north of the city, all north-going trains to start from the south of the city, and stop two or three times on their way through the city. [Applause.]

The President: I understand that Mr. Coolidge asks Mr. Delano to design our future city planning. I think, after listening to his very admirable talk, that the American Institute of Architects could not possibly select any one to design all of our city plans relative to a railroad better than Mr. Delano, but I will not undertake to ask Mr. Delano to design all our city plans at this one meeting. Mr. Delano, do you care to make any particular remark on that particular subject?

Mr. Delano: I went over to England once to spend a few weeks. I met a very courteous English railway manager, and asked him a few questions that were among the problems of railway managers in this country, and I rattled off my question. He looked at me and said, "Now, w-e-a-l-l-y, that is r-a-t-h-e-r a large order." [Laughter.] That is what I feel like saying to what Mr. Coolidge has asked.

That is a very interesting question, and I would have to think it over more than I can in a few minutes. It seems to me the difficulty might be this: that is, so far as suburban traffic is concerned—the people who want to get on to their train not to exceed four or five minutes before it leaves and step right aboard the train—no tickets or baggage to fuss with; with them it would be an ideal arrangement. But for the through travel, say the passenger who wants to go to Chicago or California, and who now takes his train from the South Station, anywhere from fifteen minutes to a half an hour before the train leaves, under this proposed plan of Mr. Coolidge, it seems to me he would go

to the North Station. He would want to get into that train at the point it starts from. Well, Mr. Coolidge may answer that by saying "A good deal of use is made of the Huntington Avenue Station or Back Bay Station by our through passengers," and that is undoubtedly so, but am I right or am I wrong in thinking that the passenger who is going the long distance and has considerable baggage to look after, prefers to go to the station at which the train starts? Furthermore, that in our very large cities there is an immense amount of traffic which has originated at those cities, and that this traffic is accommodated by the train starting from that city, not simply by a through train that makes a way station stop. As I understand Mr. Coolidge's idea, it is that those trains shall actually start at the north or the south stations, creating a lap service between those points—the passenger would have his choice of stations. I doubt if this would better the entire condition so very much in respect to through trains, but that is not at all true in respect to the suburban travel. I think that there might be a great gain by lapping the suburban service. A condition something like that exists in the west, as between Minneapolis and St. Paul. Every train, for instance, going south leaves Minneapolis and goes through St. Paul and the train going north leaves St. Paul and goes through Minneapolis, so that there is a lap of ten miles between those two cities, and it works out very well. They constitute one great city, even though under separate governments, and that lapping service does inure to the convenience of the people. [Applause.]

Mr. Coolidge: I wish to point to one extremely significant thing in Mr. Delano's paper. The fundamental conception of the paper, it seems to me, is that Mr. Delano stands for precisely the thing in regard to city planning that this Institute stands for, namely, the co-ordination, co-operation of forces, the submergence of details and the insistence upon the excellence of the total result, which is always the architect's point of view, and which we are glad to see wrought out by so experienced an authority as Mr. Delano. [Applause. Cries of, "Good, good."]

A Member: I move you, Mr. President, that a vote of thanks of the Institute be tendered to Mr. Delano for his very interesting, expert and instructive paper.

The motion was seconded, with the suggestion that it be a rising vote.

At the call of the President the Convention arose.

The President: I have the honor, Mr. Delano, of conveying to you the thanks of the Institute.

We began the study of city planning some ten years ago, at the suggestion of Mr. Glenn Brown, our Secretary, relative to the improvement and the betterment and the conservation of the original plan of the city of Washington. We shortly met the question, or were encountered with the title, devised by some one, I know not who—the title or phrase, rather, "The City Beautiful." Personally, I detest the phrase "City Beautiful." [Applause.] If I were disposed to do everything I could to delay and interrupt and confute the progress of the idea of general civic betterment, I would put in headlines at the top of every newspaper or every article that referred to city planning the words "City Beautiful," but as I am entirely of the other opinion I would absolutely suppress the phrase, and would never have it used at all. What we want is the city useful, the city practical, the city livable, the city sensible, or any other title, if you must have a title, but we want a city that is well done and a city that can be lived in. I think you will find, also, as these papers progress, that it is not impossible to achieve all of these things and more; and that the result will be a city which will be called beautiful, if you choose to call it beautiful after it is done, and be worthy of the title; and also that you will find the relation between city and suburban life, and thence on into country life, and thence on into the growth and development of the nation as a whole, which are so intimately combined that you can scarcely find a point of demarkation and separation; and, thus our topic carries us into the development of transportation in relation to all of the nation's resources.

I will ask Mr. Brown to escort Mr. Long to the platform.

I have the honor to introduce Mr. M. A. Long, of the Baltimore & Ohio R. R. Co. [Applause.]

THE LOCATION AND ARRANGEMENT OF FREIGHT HOUSES AND THE HANDLING OF HOUSE FREIGHT.

By Mr. M. A. Long,

Architect for the Baltimore & Ohio Railroad.

We often hear it said that the passenger traffic of our railroads is not a financial success. If this be true, something else must supply the great wealth of our systems, and the conclusion is that it must be the freight traffic. The handling of freight, therefore, is a great problem, and the location of the freight house must be given a great deal of study and forethought. Convenience to business is, of course, the first consideration, though street grades and land valuation must be gravely considered, as competition, especially on small package freight, is very keen and it makes the cheap handling of it a necessity.

In speaking of a freight house, one does not picture a work of art, but a building planned to facilitate the handling of merchandise, etc., in an economical manner; beauty must here give way to strength and practicability. In country towns, where the volume of business is small, there is one building designed for both shipping and receiving freight, but in the large cities two houses are used for the greater facility of handling it. There are termed outbound and inbound houses, and both should be so located that the cars can be emptied at the inbound and refilled at the outbound with the minimum amount of switching.

The usual width of an inbound house is approximately fifty feet—a wider house making the trucking too expensive—while that of an outbound house is approximately twenty-five feet. Each house should have a platform eight feet in width along the track side, so as to obviate the necessity of spotting cars to suit the door openings.

The length of the houses depends, of course, on the amount of business to be done and the ground available. Unfortunately, in some large cities the inbound houses are separated from the outbound because of the lack of room to combine them; but where it is possible to do so it is best to have them close together, so as to decrease the amount of light-wagon mileage to a minimum.

The business to be accommodated governs the style of the structure; volume and character of traffic and the time it will have to remain on the floor being taken into consideration.

Each terminal yard should be provided with an overhead crane, reaching over two tracks, a platform and a roadway; which will admit of heavy loads being transferred from car to car, car to platform or car to wagon.

It is an advantage to have a cold-room for storing butter and eggs and other refrigerator car freight awaiting loading; which, in winter, may be used for perishable freight and vegetables to keep them from freezing.

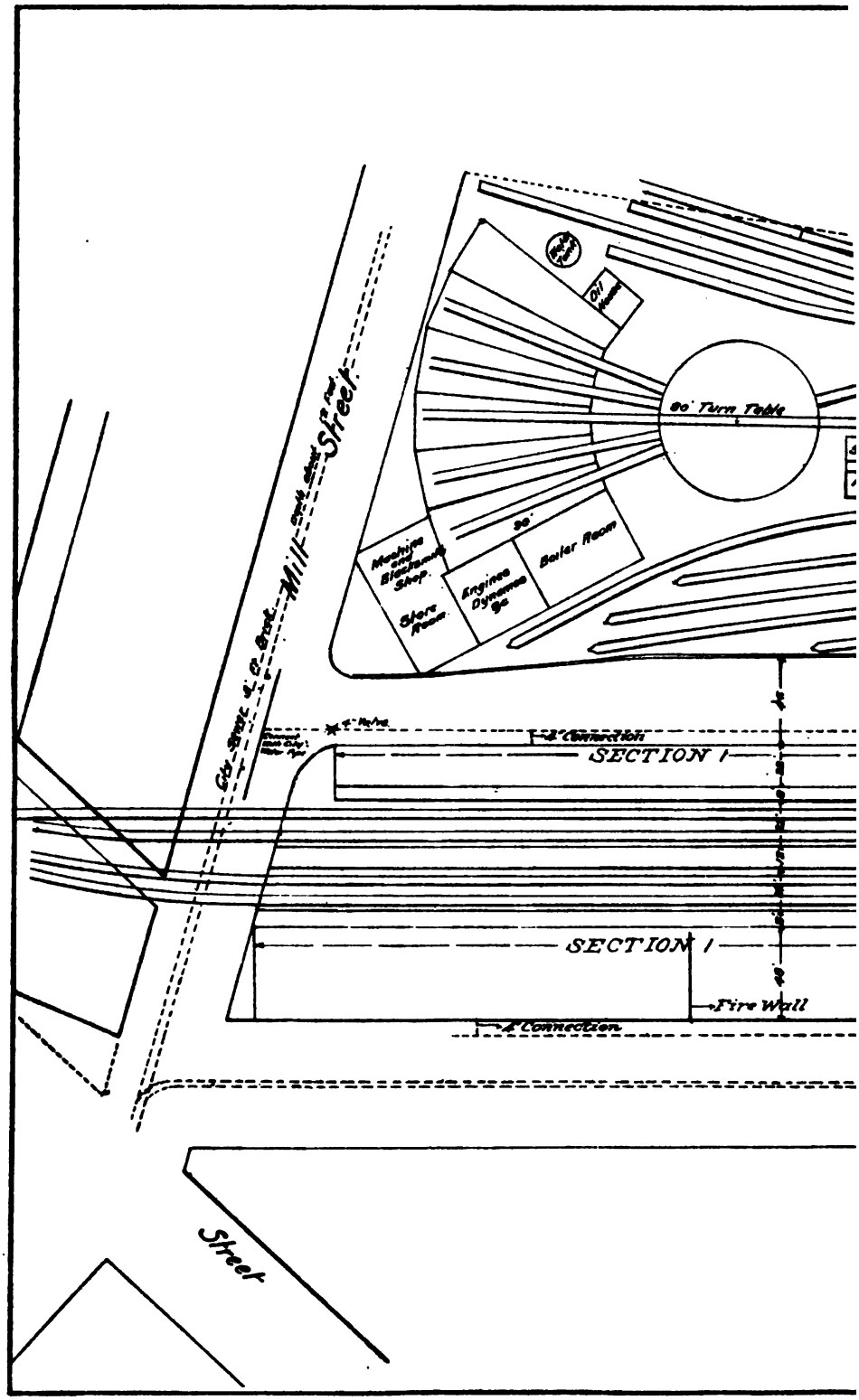
It is the terminals that limit the efficiency of a railroad, and if in a terminal

INBOUND FREIGHT AND WAREHOUSE, CINCINNATI, OHIO.

OUTBOUND FREIGHT, TRANSFER PLATFORM AND WAREHOUSE, CINCINNATI, OHIO.

C.C. & ST. L

96 Passenger
102 Freight


Street
90' Turn Table
Machine and Blacksmith Shop
Store Room
Engines Dynamos &c
Boiler Room
4" Connection
SECTION 1
SECTION 1
Fire Wall
4" Connection
Street

having chains with arms; a continuous platform or belt; telpherage system, with motor trolleys running on an overhead rail or carrier, for picking up packages or trucks.

A telpherage system is being installed by the Baltimore and Ohio Railroad Company, in its new freight Pier No. 8 at Baltimore, Md., which will be completed and ready for use in a few months. This system consists of two longitudinal overhead tracks running the full length of the house, or approximately nine hundred feet, and cross-connected with tracks every twenty feet. On these overhead tracks there are carriages with trolley attachment and equipped with an electric hoist. Attached to each carriage is a cage for the operator, and from this he can operate the switch in front of him while running. These carriages, when loaded, travel at an average speed of about six miles per hour, the lifting hoist having a maximum capacity of four tons.

On this pier there are also tracks for cars and we expect to handle freight in large packages from cars to vessels and vice versa. This mechanical apparatus is more economical in a house of this kind than in an ordinary freight house, where the packages are small and diversified.

There is, as stated before, a great need of better equipment for handling all kinds of freight in houses, piers, etc. Europe, notwithstanding her cheaper manual labor, has many more economical devices already installed than we have. Our business is advancing in great volume and there is, in my opinion, a large field for those of an inventive turn of mind to solve the great problem of handling small package freight in large volume, quickly and economically.

Mr. Rich moved and Mr. Litchfield seconded the motion that a vote of thanks be extended to Mr. Long, which being put by the President was duly carried.

The President: The next topic is "The Relations of the Railways to Conservation of Natural Resources," by Mr. M. V. Richards, of the Southern Railway Company. I will ask Mr. Brown if he will be good enough to escort Mr. Richards to the platform. [Applause.]

Mr. Richards: Mr. Chairman, and gentlemen of the Convention, I am very sorry indeed that our President, Mr. Finley, of the Southern Railway, found it not possible to reach here this morning on account of engagements in other directions. This is such an important subject that I thoroughly feel my incompetence, but we should be and are under obligations to you for listing this subject which I am to handle in your programme. It is one in which all the people of our country are interested, and I am glad to say that the railroads are very deeply interested in it. We arrived here this morning from a convention

PIER 8, LOCUST POINT, BALTIMORE, MD.

INTERIOR VIEW, PIER 8, BALTIMORE, MD., SHOWING SECTION OF TELPHERAGE SYSTEM.

in Chicago, of which Mr. Delano was President, at which some of the speeches in connection with conservation of natural resources were discussed.

THE RAILWAYS AND THE CONSERVATION OF NATURAL RESOURCES.

By Mr. M. V. Richards,

Land and Industrial Agent of the Southern Railway, Washington, D. C.

The conservation question is not a new one, but only recently has its importance been properly recognized. Throughout our national life we have been so engaged in making such use as we could of our natural resources in the way of active production that we have been little concerned about the sources of our raw supply, much less regarding their permanency. We have studied carefully the problems of cheap production, but only as regarding lower cost, overlooking or regardless of the fact that much of the cheap production was attained by an ultimate cost that would later make all production expensive, and so limit our business and industrial activities. Some few of our great industries, such as the packing houses, have solved for themselves their own problems of conservation by finding ways and means to utilize what was at one time their waste material; and to-day their profits come largely from such utilization.

There is now a remarkable awakening in the public mind regarding the conservation or the protection of our natural resources, and there is now a more or less comprehensive idea of what such conservation means and how it is to be brought about. It is something which affects in the closest manner the whole character of our future development as a productive nation, and every channel of industry has something at stake in the success or failure of the efforts to educate the country up to the carrying out of a broad, far-reaching policy of conservation.

Dependent upon the production and consumption of the people for their prosperity, naturally the railroads of the country must take an interest in the discussion of this problem. Their relation to the whole field of production makes them peculiarly interested, while the fact that as development agents conspicuously influential in the settlement of new and the growth of old sections all transportation lines must be deeply concerned in anything which affects the character and permanency of the country's growth.

CONSERVATION MEANS TRUE DEVELOPMENT.

True development means the conservation as well as the exploitation of our resources, and it seems to me that this whole conservation problem is but a part of the question of national and local development. In every section of the country the railroad corporation is engaged in development work, not merely as a passive

agent through its function of common carrier, and therefore furnishing the outlet for the products of its territory, but actively and aggressively, by the employment of whatever means it can to co-operate with every agency in the building up of that territory.

The railroad is not after merely temporary traffic. The practical and far-seeing railway man is constantly seeking permanency of business as well as volume and character. Railroad investments and railroad lines are meant to be permanent. Undue changes in conditions in a district, the destruction of natural resources, destroy permanency of traffic to a great degree, force the constant development in new lines to secure profitable business, prevent the provision of proper facilities. In the former great timber districts of the northern border States, as well as in large portions in the south, we have seen towns spring up, flourish and decay from the development and decline of the industry. Long stretches of railroad built to accommodate such traffic have become unprofitable, sometimes been abandoned, until a new development in other lines could take place. Such conditions unfavorably affect not merely the earning power of the railroads, but the traffic charges, facilities, and so all the various interests of a community or a section. This is an illustration which may show the interest of the railroad in a policy which will tend to put the country's development on a more permanent and profitable basis, with its resulting permanency in the character of the transportation business. We know that the life of the forests and of the timber industry can be indefinitely extended, while other developments of a permanent nature can be brought about without hurt to the timber interests and to the great benefit of both industry and transportation. We know that in other ways the conservation of resources by proper handling will extend the life of various industries without any great diminution of the regular output demanded by trade.

The great work of conservation carried on at present is in forestry, the reclamation of swamp and arid lands, bringing into profitable cultivation the desert districts of the west, soil preservation and soil building. No better or greater work has ever been done by any government than that now carried on by the United States through the various bureaus of different Departments, and the putting of this work on a proper basis marked the beginning of a new and greatly advanced epoch in our national development. [Applause.]

THE CONSERVATION OF THE FORESTS.

A few facts should make emphatic the worth of the work of the Forest Service, and the necessity for the preservation of our woodlands. The original forest area of the United States is estimated at 850 million acres, containing 5,200 billion feet of timber; the present area is estimated at 550 million acres and the standing timber at 2,500 billion feet, 65 per cent. of the original area and 48 per cent. of the original timber. Our annual lumber production is about 40,000,000,000 feet, and there is in addition an immense consumption of forest products for other purposes. From

1880 to 1907 the estimated lumber output was 768 billion feet, or about one-seventh of the estimated original forest growth of the country and over 30 per cent. of the estimated amount of standing timber in 1907. These figures show that our forests are steadily disappearing at a most rapid rate. How important the industry is to the country in a mere commercial way is shown in the fact that the yearly value of lumber, lath and shingle manufactures, according to the figures gathered by the Forest Service, is $750,000,000, and that of all forest products $1,280,000,000. There is a growing scarcity of timber of every kind, with a resulting increase of prices which must affect in a detrimental way almost all avenues of business. We know that the magnificent forests of white pine, probably the most generally useful wood we have known, have all but disappeared. Yellow pine is growing scarce and the great forests of the Pacific coast will disappear in the same manner under like methods of lumbering. The annual production of hardwoods is steadily decreasing. The annual cut is about seven billion feet and it is estimated that the consumption for all purposes and the waste amount to 25,000,000,000 feet. The total amount of standing hardwood is said to be about 400 billion feet, or only about 16 years' supply at the present rate of consumption. Of this supply one-half is in the Appalachian Mountain region. South of Pennsylvania the hardwood area was estimated at 58,000,000 acres, and all but 15 per cent. of this has been at least partially cut over. A large portion of the cut-over lands may possibly be utilized for growing a new supply. This condition would seem to demand the establishment without delay of the White Mountain and Southern Appalachian forest reserves. [Applause.]

What the growing scarcity of timber means may be judged somewhat from the advancing prices of stumpage. From 1900 to 1907 white pine stumpage advanced from $3.66 per thousand feet to $8.09; yellow pine from $1.12 to $3.16; white oak from $3.18 to $6.52; poplar from $1.58 to $4.37, and all other woods the same way. The business depression of 1907 temporarily checked this advance.

There is the startling fact that it is estimated that only one-third of the trees felled by lumbermen are ever utlized, while the most reckless waste exists in all directions in the use of our woods. One-eleventh of our forests are swept by fires every year at an annual loss of $50,000,000. Our paper mills are having difficulty in finding lumber for their use. Surely there is need of encouragement of forest conservation on the part of every interest. The railroads of the country handled in 1907 over 172,000,000 tons of forest products, or 10 per cent. of all traffic. It may readily be seen how much the preservation of the forest on a permanently producing basis means to them. It has been estimated that the railroads use each year 620,000,000 ties in renewals and in new construction. The constantly increasing price of ties and telegraph poles and the difficulty in securing suitable supplies is a growing expense which causes every railroad corporation much concern, and presents one of the problems to which transportation men are giving much attention. Several railroads have undertaken to solve it by planting rapid growing trees along their rights of way and on forest reservations of their own. Careful study is devoted to preservation methods by which the life of the wood will be greatly extended, and by

such methods very much will undoubtedly be done to keep down the annnual demand for new ties and railroad timber. The estimate is that there is spent for railroad ties, posts and poles each year $100,000,000.

NAVIGATION AND PROTECTION OF WATER POWER.

The problem of forest conservation covers much more than the timber supply of the country and the maintenance of the timber industry. It has an all-important bearing upon our water supply and upon our agricultural interests. If we are to make our rivers reliable channels of commerce we must look to the preservation of the forested areas on our mountains. The railroads have been accused of killing river traffic. The greatest enemy to river traffic has been the denudation of so large a portion of the wooded lands at the sources of our streams. [Applause.] The railroad interests are not inimical to the development of a system of interior navigation which will be efficient. [Applause.] The line of transportation development and the growing demand in the country for increased transportation facilities make the rivers and the lakes contributors to the prosperity of the railroads.

The annual destruction of property by floods, the direct result of our unintelligent system of forest despoilation, is a terrible tax upon every branch of industry. The railroads suffer in common with other interests from such destruction, while their immediate losses from the destruction of tracks and bridges and the interruption to traffic levies annually a great sum upon them.

If no other source of national development and prosperity were to be conserved by the care of our forests, the protection of water powers from destruction and the creation of regular and adequate supplies of water for them would justify the keenest attention to the subject. It is estimated that the rivers which are fed from the White Mountains will furnish 500,000 horse-power, of which something over half is in use, and which supplies the power for factories in which $250,000,000 have been invested. The power available in the streams flowing from the Southern Appalachians has been estimated as high as 5,000,000 horse-power. It is probable that nearly 50 per cent. of this is available for economic development, a development which means an annual charge for horse-power of $27,000,000 and the wide expansion of the manufactures of that region. Figures collected recently showed that along the Southern Railway 450,000 horse-power was developed or under construction. In other portions of the country the amount of available horse-power is to have the most far-reaching effect upon the future of our national development. The conservation of our forests will keep this important source of wealth and production at a maximum.

IRRIGATION RESULTS AND POSSIBILITIES.

The reclamation of lands in the west by irrigation has already brought large areas into the most profitable cultivation, developed heretofore valueless regions into most productive territory, created new settlements and built towns. These

regions are producing all kinds of crops, often giving the greatest farm profits, and are already adding a very large amount to the nation's agricultural returns. Many thousand people within the past few years have found prosperous homes there. It is stated that one sage bush district with 2,000 people in 1902 is now the home of 20,000 settlers. So valuable have they appeared to the railroads of the west that these roads have done everything possible to promote the irrigation policy. It is estimated that 30,000,000 acres of arid lands can be reclaimed by irrigation, which will furnish homes for 1,000,000 people.

GREAT BENEFIT FROM SWAMP LAND RECLAMATION.

Even more important, perhaps, than the irrigation of the arid lands is the reclamation of swamp and overflowed lands. The area of such lands in the States east of the Rocky Mountains amounts to about 77,000,000 acres. Some of these lands are now partially available for crops at certain periods or for pasturage, but 52,000,000 acres will not be available for use until properly reclaimed. These lands are known to be of the richest soils and when reclaimed will be among the most productive and most valuable known. What they will do has been shown in every section of country where they have been utilized. They are suitable for the grains, in the south for cotton, for grasses and grazing, and are especially valuable for the profitable truck crops. This great body of land now little used or entirely unused can be made available for the homes of 2,000,000 people and will give returns of from $15 to $100 or more per acre. Planted to corn and yielding only 30 bushels per acre, scarcely more than the present average for the country, on both good and bad lands, they would yield two-thirds as much as the crop of the whole country this year, estimated to be worth to the formers $1,720,000,000. [Applause.]

SOIL BUILDING AND RECLAMATION NECESSARY.

Soil preservation and soil reclamation mean all the difference in the future between profitable agriculture and unprofitable agriculture, between a steady increase for years to the sum total of our farm products and either a decrease from lowered fertility or a limitation to production which will surely be a check to our national prosperity. From ignorance of the character of soils, their adaptability to different crops and of their proper treatment, vast areas of land have been rendered almost worthless for agricultural purposes and other vast tracts have become unprofitable. We are to-day farming a much larger acreage than is necessary to produce the total yields of agricultural products we consume and export, magnificent as is the total of our crops. Our present yield of wheat per acre is less than 14 bushels, the lowest of any wheat-producing country except Russia. It can be made 20 bushels or more. Our average cotton yield is only about 200 pounds per acre. Some farms produce 1,000 pounds or more, and without more fertile soil than many which give the minimum yield. It has been proven that by proper care of the soils their

fertility cannot only be retained but increased, and instead of decreasing yields there will be larger crops. In 1900 there were 841,201,546 acres in farms in this country, less than 50 per cent. of which was improved. It is a known fact that very large areas are utilized for crops for which they are not suited and are, therefore, unprofitable, while a proper understanding of the use to which they should be put would make them valuable agricultural lands. It is also a lamentable fact that by unwise cropping and cultivation vast areas are being rendered unproductive. All through the older States as the result of ignorance of soils and soil management and through erosion a large part of the agricultural lands have been abandoned. It is certain that not only can the original fertility of the lands be retained and increased, but these so-called worn-out lands can be reclaimed to their old fertility and again made producers of wealth. The soil survey work shows this. In New York and other States investigation has shown in the same neighborhood abandoned farms alongside the most profitable, with the same kinds of soils and original condition on each; treatment of these abandoned lands prove their reclamation is an economic success. This is true in all portions of the east and south.

Another class of lands are those of little native fertility and value for agriculture, and these can be made productive by soil building methods. This is a most attractive branch of the conservation of our resources, one which is of greatest and most general importance. Either directly or indirectly our agriculture is responsible for perhaps 50 per cent. of all the tonnage moved over American railroads, for the bulk of our industrial products. Our factories find and always will find their best markets here in our own land. By the reclamation work of worn-out soils, by the maintenance of fertility and the building up of soils, the aggregate of our agricultural products can be easily doubled without the addition of any large acreage to that now in cultivation. That means, under prices now prevailing, at least $8,000,000,000 added to our national production each year. It means a steady and profitable business for our transportation systems as well as additional business for every branch of industry. The railroads understand the value of this soil conservation so well that nearly every line in the country is lending such co-operation as it can to the United States Department of Agriculture and the State work in the education of the people regarding it.

The mines of the country cannot be preserved as can the forests. When they are worked out they are gone forever. Despite the vast deposits of coal, iron, copper and other materials at our command, we know there must come a time when this source of industrial activity, of commerce and national wealth, will have largely disappeared. All that can be done is to conserve the deposits as much as possible by economy in use and by proper methods of handling, so as to extend their life. There may well be introduced methods of handling the waste ores, while the utilization of slack and inferior coals by briquettes will do much to practically add to the present available supply of such minerals. Much can also be done by methods of mining, and, especially with our iron ores, by the prevention of the waste in use. This class of freight gives the railroads half their total traffic, and any methods by

which the life of this traffic can be maintained interests them. They will welcome and encourage any improved methods looking to the utilization of our minerals so the greatest benefits may be obtained from them.

The adoption of better building methods, the use of materials which will lengthen the life of all structures and which will decrease the annual loss from fires, so great a tax upon us, will greatly conserve our resources, and place all lines of industry on an improved basis. As it is able and as rapidly as seems practicable the American railroad is adopting policies which will not only give a better class of buildings for its use, but make them more permanent. This is something in which the architect may perform the greatest service to all classes of people. A time will come when the architect of high standing will insist on plans and on the use of materials which shall practically do away with our present enormous fire losses, and which by the use of various materials in place of wood will not only help in the conservation of our forests, but assist in the development of other industries which will add to our productive activities. [Applause.]

The various lines of conservation are closely related, they must all be carried on, all of them are of vital importance to all classes of our population and to every avenue of business. The carrying out of a broad and efficient conservation policy naturally must center in the hands of the national government and be taken up by the various State governments. The greatest need at present is education regarding its meaning, the necessity for the work, and in influencing the people to utilize the information and methods which are available in their individual work. Its success depends upon intelligent co-operation of all the people; and the men engaged in the various avenues of industry and commerce, whether production, construction or transportation, may profitably exert their influence and adopt such measures as they can to promote the policy. [Prolonged applause.]

Mr. Waid: I move you, Mr. President, that a vote of thanks and appreciation be extended to Mr. Richards for his instructive and inspiring paper.

The President: You have heard the motion, gentlemen.

The motion was duly seconded, and upon being put was carried.

The President: Mr. Richards, I have the honor to thank you on behalf of the Convention.

It may not have been obvious at first that the architects of the country come into any very direct relation with the conservation of our natural resources, but in the matter of forestry alone, I am told, on the authority of an officer of the Forestry Division, that if the architects should specify in the construction of their buildings short lengths of lumber, where such could just as well be used as long lengths of lumber,

without impairing the structural finish, that they would save about one-fourth of the lumber cut in the United States, and do as much as any other one body of men could do to conserve the natural resources of the country.

I have the honor to introduce Mr. J. V. Davies, and ask your attention to him.

Mr. Davies: Mr. Chairman and ladies and gentlemen, I owe this gathering somewhat of an apology for the title of the paper. The title of this paper should have been in the singular instead of the plural. The Company was asked some time ago to present the case of the relations of a terminal such as the Hudson & Manhattan R. R. in New York, to architecture and the architectural profession, and I accepted that invitation jointly with Colonel Wells, and meeting Mr. Gilbert explained that we would be glad to take up the specific subject of this terminal station if it was pleasing to him, and he expressed a desire that we should do so. This, therefore, is intended to represent the specified case and not the plural.

I want, before beginning the paper I have, as Mr. Delano's paper has brought out one or two little matters that bear on my subject, to say a few words as to what the proposition is that we are up against, but I doubt very much if many here know what the congestion of trains in New York means. The transportation in the city of New York on the various surface, subway and elevated lines, represents a movement per annum of some seventeen hundred million people, as many people as the whole known population of the world, moved in one year period by the railroads within the metropolitan district of New York. This little railroad that we represent here to-day, is moving at this time, only four months after the beginning of its operation in the end of July, at the rate of between fifty million and sixty million persons per annum, and it is the terminal station of this particular and specific railroad that we have the honor of presenting here to-day.

HUDSON TERMINAL BUILDINGS.

A TERMINAL STATION.

By Messrs. J. Vipond Davies and J. Hollis Wells.

The title of this paper would indicate that the subject is one general in its extent, but this, however, is not the case, it being our endeavor to present the unique and novel proposition arising out of new conditions developed by the rapid transit situation in a great city, and to outline the history and development in the case.

The growth and development of the great cities have introduced conditions arising from the concentration of population which has necessitated in turn new means of transportation to meet these conditions as they have arisen. In all such cities the so-called business district is necessarily very concentrated, which is largely on account of the necessity for constant and continued intercourse of people engaged in business, making it most desirable that their office or other place of business should not be at any great distance from those with whom they transact their daily affairs. The introduction of the telephone has undoubtedly enabled this business district to be expanded over an increased area, but even with this means of communication it is neither feasible nor desirable to spread the business of a great city over a larger area than can be avoided. The concentration of business into a comparitively small district has involved on all the larger cities the well known condition of enormous difficulty in transportation during the daily periods known as the "rush hour," which embraces a couple of hours in the morning for passengers en route to their places of business and a similar period in the evening for those returning home. These conditions are obviously accompanied by a condition involving enormous increases in the property values in the business district, and in order to obtain an adequate return on the investment in property in this district the familiar practice has developed of erecting high buildings so as to obtain the greatest building facilities in proportion to the land area occupied and thus the maximum returns in the form of rentals on the investments.

The transportation problem has developed largely in recent years, London being the first city to feel the need of these developments. That city is, however, very different from the American cities in that the streets are extremely narrow and badly adapted to heavy and congested traffic. Fortunately the underlying soil in London is peculiarly advantageous to the economical construction of underground railroads, and for many years there has been developing a system of underground transportation very advantageous to the people and to the development of the city and its surroundings. London has not, however, adopted very extensively the American custom of erecting high buildings and has only recently utilized to any extent the steel frame type of construction of high buildings. The principal reason for this is that the laws relating to "Ancient Lights" make almost prohibitive the construction of high buildings in the densely built-up sections. With respect to transportation facilities, however, London is far ahead of any other city in the world. In the congested thoroughfares of that city the police regulations prohibit the un-

loading of coal, freight, or any other such materials during the busy hours of the day, and all this traffic is necessarily handled during the early or late hours when traffic is light. The result of this is that the whole of the narrow streets is available for traffic. At the same time the construction of subways in London has gone far ahead of the necessities and uses of the same, and investors in the tunnels and underground railroads are confronted with the situation of being unable to obtain traffic sufficient to permit of paying interest on the investments.

The condition in New York is one which has developed in an acute form during a very brief and recent period. The peculiar conformation of New York and the history of its growth has made the southerly point of Manhattan Island the business center of the entire greater city, and owing to the numerous lofty buildings erected in the downtown section on Manhattan Island the concentration of the business population is very great. Further, as the growth of the tributary population has radiated from that downtown center it has spread into the State of New Jersey, and as a result there has been built up in that State within the immediate suburban district a population exceeding a million people, all tributary to the business center of New York City. Owing to the geographical formation of New York the only direct rail connection northward from Manhattan Island is out into the Bronx. The boroughs of Brooklyn and Queens, representing an immense tributary population of nearly two million people, are cut off by the East River, which, however, is sufficiently narrow to permit of building bridges over it at certain locations, and there are now either in operation or nearly completed four immense and magnificent bridges over the East River, connecting the Borough of Manhattan and the outlying districts of Long Island.

The provision for crossing the Hudson River for the suburban population resident in New Jersey, as before mentioned, has heretofore been solely that of ferries. These ferries have with the passing of years been improved and developed so that now the modern ferryboat is an exceptionally convenient and advantageous means of transportation in so far as a ferry could possibly be. Such a conveyance, however, requires the transfer of passengers at each side of the river, and this mode of conveyance is of necessity somewhat slow; not so much in the actual movement between the ends of the piers, but in landing and starting on one side, and in entering the ferry slips, landing and unloading on the other, and in cases of fog or storm, or under the winter conditions of ice, or when other craft moving up and down the river obstruct the passage of the ferryboats, the ferries are seriously delayed and impeded in their movements. Notwithstanding these difficulties the ferry traffic crossing the Hudson River has reached a point of great magnitude, and a conservative estimate, based on actual count of a single day's traffic, indicated that the total number of people using the ferries across the Hudson River prior to the construction of the tunnels of the Hudson & Manhattan Railroad, was 120,000,000 per annum.

There is an added difficulty also in the situation in New York in that all the main line railroads, excepting;the New York Central & Hudson River and the New York, New Haven & Hartford lines, terminate on the west bank of the Hudson River, and

have thus been cut off by the Hudson River from direct physical connection into New York city. These railroads include the West Shore, the Delaware, Lackawanna and Western, the Erie, the Pennsylvania, the Lehigh Valley, the Baltimore & Ohio, the Philadelphia & Reading, the Central Railroad of New Jersey and the New York, Susquehanna & Western.

The desirability of a tunnel line entering New York City from New Jersey was first practically considered in 1873 when the Hudson River Tunnel Company was organized and laid out plans for a line from a point at the foot of Fifteenth Street, Jersey City, across the Hudson River to New York city, proceeding to Washington Square for a terminus. At that time the proposition was for a steam railroad, it being the intention to locate a Union Station in New York in the vicinity of Washington Square, which was the residential district. The location adopted was suitable to the uptown shopping and residential districts, but the lapse of time before the scheme reached fruition and the pronounced movement of these districts northward in the interim, necessitated other terminals which have been since provided by the extension of the lines of the Hudson & Manhattan Railroad (successor to the parent company) along Sixth Avenue to Forty-second Street and Lexington Avenue, the construction of which has been already completed to Twenty-third Street, and work is now in process north of that point.

As is obvious, this uptown line provides no facilities for the dense daily movement into the downtown business district, and, consequently, before the development of the proposition of connecting all the railroads terminating in New Jersey to the uptown section of New York had advanced far toward solution, the project was extended to connect all these railroads also to the downtown district. The heaviest passenger movement in Jersey City centers at Exchange Place and includes the traffic from the Pennsylvania and other steam railroads, as well as the very heavy pedestrian and street car movement terminating there. In Manhattan the center of greatest concentration is south of the City Hall, and in locating lines for a tunnel railroad the problem presented was:

(1) To obtain a location close to Broadway where a terminal station could be reasonably located, realizing the necessity for electrically operating trains of cars under a multiple unit system with cars of proper dimensions to be operated over the tracks of the steam railroads to the suburbs of New Jersey.

(2) To obtain such a location where the value of the property would not bear too heavily on the finances of any such undertaking.

It was obviously undesirable to cross Broadway—first—as the east side of that thoroughfare is of no greater value for the handling of passengers than the west side at equal distance from Broadway and the difficulties and expense of caring for the old buildings with their poor foundations would have enormously increased the costs and hazards of tunnel construction; and, second, the connections with other lines of city transportation are vastly better west of Broadway.

Owing to the topographical conditions, a stub-end terminal, with parallel tracks, would have been quite impossible at any location downtown, aside from the loss of

utility in the approaches to any such terminal station. The general scheme of operation of the Jersey terminals and the plans for the uptown lines had determined the factor of train length as 8 cars, each 48½ feet long, necessitating a station track 388 feet in length and station platforms on tangent approximately 350 feet in length. The Rapid Transit Railroads Commissioners had made the rigid requirement that any tunnel railroad entering this section of the city must be at such depth as to leave not less than twenty feet between the external line of the top of construction and the surface of any north and south street, in order to preserve intact all the main north and south streets for subway construction to meet future development. In this case the requirement was immaterial as the grade from the river to the terminal necessitated at least this depth. The general proposition provided for the future four river tunnels (two in each direction) and each tunnel required two terminal tracks, and an extra track was provided on which to lay up a crippled or out-of-service train; consequently a station with five tracks was necessary.

For rapid operation a station located on a loop would provide greatly added efficiency in operation, eliminating all questions of switching, and thereby maintaining single end movement.

Certain large parcels of property could be purchased along Church Street and the distance between Cortlandt and Fulton Streets was ample for the various above mentioned conditions.

In the earlier consideration of the plans for the uptown proposition the question of arrangement of tracks and platforms at terminal stations had been carefully gone into. For these suburban transit schemes the traffic is purely passenger service and platforms having an elevation similar to the floor of the car (or, say, 42 inches above the top of rail) are essential to the rapid loading and discharge of passengers. The old idea of increasing tracks in stations is a false advantage as it is obvious that if a carload of people can be discharged instantly on to platforms the train itself is free to proceed while the platform can gradually discharge its load. The English custom of having a separate door to each small compartment to a car equivalent to a door to each ten persons is ideal in this respect but not adaptable to our operating conditions. The introduction of mechanical means for operating the doors of cars permitted us in the design of this equipment to use broad side doors at the center as well as at the ends. The question then remained as to the best arrangement of platforms in relation to tracks. A single platform used for loading and unloading, even with the use of end doors for discharge and center doors for loading, always involves conflict and interference in operation, which detract seriously from its usefulness. It was desired to maintain continuous movement in one direction for passengers and to take out of the power or discretion of the traveling public the possibility of making mistakes. To accomplish this it was only necessary, therefore, to separate the direction of movement by designing the stations so that each track should be served by two platforms; one for loading passengers, the other for discharging. Each platform also serves two tracks and passengers are distributed for destination on the loading platforms before they enter the trains, either on the right

or left hand. The unloading movement is simpler as there is no need to specially distribute the passengers.

There was, therefore, now presented for solution an absolutely new proposition, involving the foregoing conditions, for a terminal station downtown for the Hudson & Manhattan Railroad, and the great cost and expense of the real estate gave to it a specially new aspect. In Europe particularly, but to a less extent in Canada and the United States, the adaptation of the terminal headhouse to hotel purposes has been common, but in all these cases only the area covered by the headhouse has been utilized by the construction of station waiting rooms, ticket offices, baggage facilities, etc., on the street level, and above that the building developed as a hotel. In no previous case, as far as the writers recall, has the train-shed been utilized except at the Flatbush Avenue, Brooklyn Terminal, Long Island Railroad, and the Grand Central Improvements of the New York Central Railroad at New York. At those points there have been constructed over the depressed tracks branch postoffices and offices for the railroad administration, and this also the Pennsylvania Railroad Company is now doing at Thirty-second Street and Eighth Avenue, New York city.

In this proposition the small area of land required for underground terminal facilities was very costly, involving an average price of between $40 and $45 per square foot for purchase, exclusive of the payment under franchise provisions for lease and use in perpetuity of the underground space of the adjacent streets. The original idea was to construct a railroad station with a simple shed cover over the area at the street level, but a consideration of the unremunerative condition of such a great investment (over $3,000,000) made necessary a reconsideration on the basis of improving the property to yield interest on the investment apart from the railroad proposition. The location adopted made anything but an office building undesirable and in conjunction with a railroad terminating there, that plan appeared most advantageous. Fortunately, too, the highest courts of the State decided that the right of a railroad corporation to condemn lands for railroad purposes carried with it the right to also improve such property for other uses.

As previously mentioned, the location adopted for the railroad was by a line from Jersey City eastward to the foot of Cortlandt Street, under Cortlandt Street to the private property at Church Street (the next street west of and parallel to Broadway); thence due north under this property and crossing under Dey Street to Fulton Street (420 feet between the north line of Cortlandt Street and south line of Fulton Street); thence turning west under Fulton Street and again crossing the Hudson River to Jersey City. The width of the station site averages 180 feet, and including the widths of Cortlandt and Fulton Streets, the length north and south is 530 feet.

The elevation of the tracks in the station was determined (subject to the limitations of the Rapid Transit Railroad Commissioners) as 11.7 feet below mean sea level or at a depth of 36.86 feet below the street surface at Church and Dey Streets, and this depth was altogether too great for the movement of passengers up and down without an intermediate landing. For railroad operation the shorter the movement vertically or horizontally between the concourse, or distributing floor, and the cars,

the better, and as the clearance needed for the cars was only 12 feet 6 inches above top rail and the floor depth required was only 24 inches, a grand concourse was laid out at an elevation of 4.33 feet above mean sea level. In this case there was an added advantage as at this level the concourse could be constructed continuous under Dey Street and practically over the entire area of the station site. The only necessary function, therefore, of the street level in connection with the railroad station was to provide adequate access and egress for passengers, well distributed, to the concourse floor, and with that exception the entire surface area was available as part of the office buildings now developed.

The provision of platforms, stairways and openings had next to be considered. To do this intelligently it was necessary to work back from the ultimate carrying capacity of the tunnels. The capacity of each pair of tunnels is one train load of 800 persons on a headway of 90 seconds, or say 530 persons per minute, and this neither arriving nor leaving at times of maximum movement in one direction as the reverse movement is always comparatively light. Two terminal station tracks will easily take care of this service, allowing three minutes for the train to enter and stand in the station. As there are two pair of tunnels provided for the future (one pair of which is now in operation), the station was laid out with four operating tracks, and an additional track, allowing only for unloading passengers, for car inspection and for storing disabled trains. The unloading platform widths and areas need to be sufficient to hold only such part of the trainload as would not have passed on to the stairs when the last portion of the trainload has discharged, and obviously a floor area equal to the train itself is more than adequate, providing there is no undue congestion on the stairs. In order to load a train promptly the loading platforms should have sufficient area for a trainload of passengers to stand without undue crowding, largely grouped along the edges at the points where the car doors come when the train stops, with sufficient space in addition to permit a free passage through the crowd being maintained. The width should be greater than that of the unloading platform, and should not be less than twice the width of the trains. Alternating the platforms as before mentioned and thereby maintaining one way movement, permits this. The platforms as finally arranged are as follows:

Along the Church Street side an unloading platform 11½ feet wide serving one track; area 5,200 square feet.

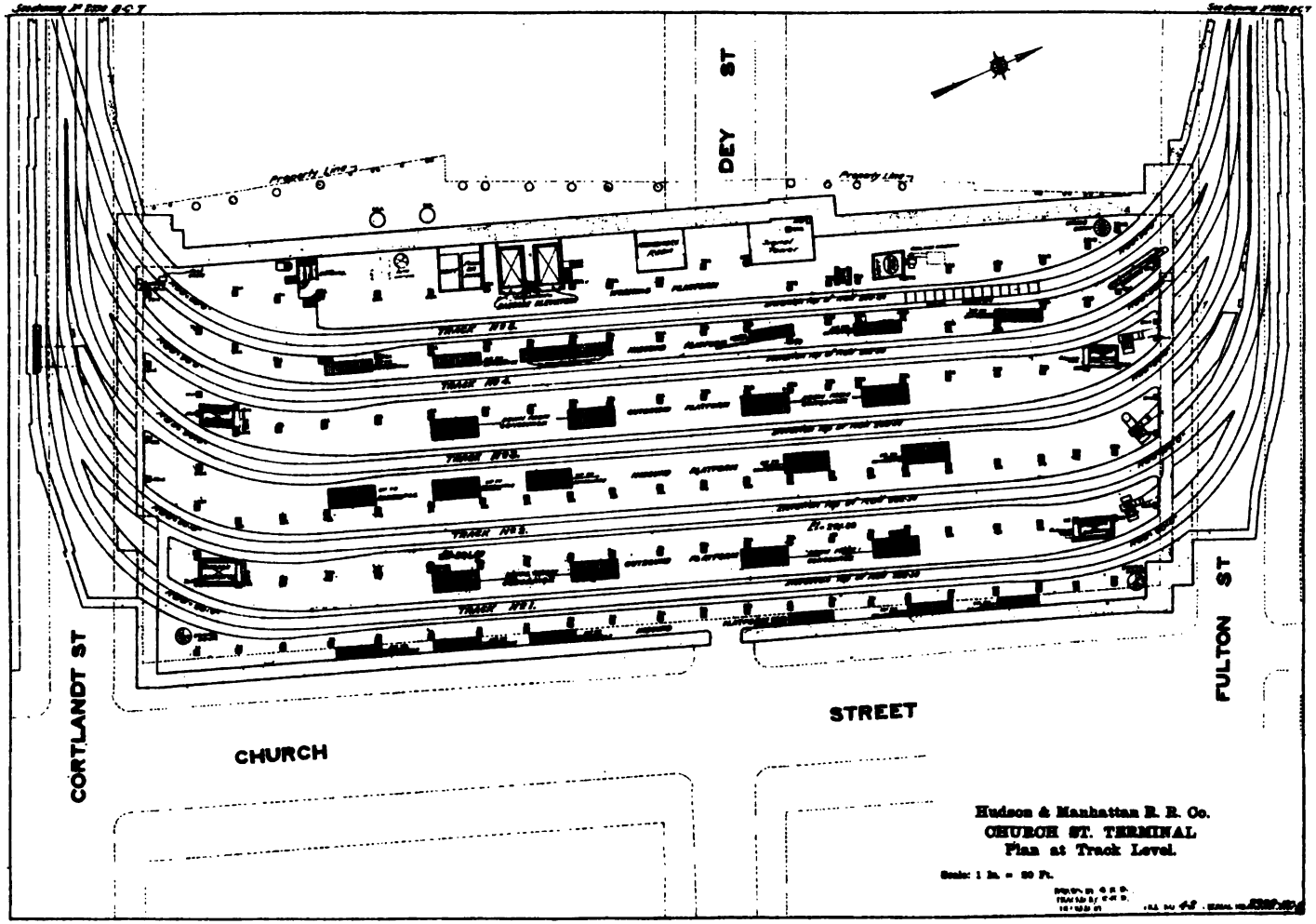
Between tracks Nos. 1 and 2 a double loading platform 22 feet wide; area 9,000 square feet.

Between tracks Nos. 2 and 3 a double unloading platform 22 feet wide, serving two tracks; area 9,300 square feet.

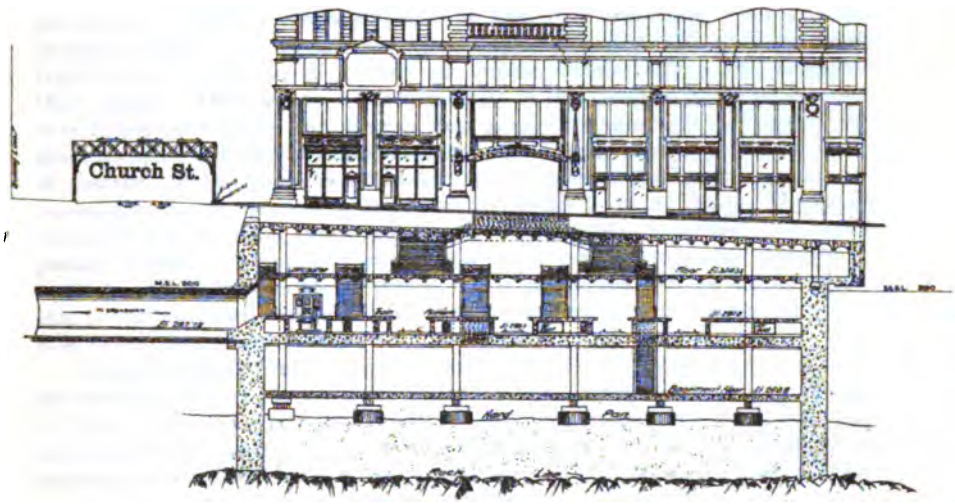
Between tracks Nos. 3 and 4 a double loading platform 22 feet wide, serving two tracks; area 9,300 square feet.

Between tracks Nos. 4 and 5 a single unloading platform, 13 feet wide, serving No. 5 track only in emergency and being regular only for No. 4 track; area 5,400 square feet.

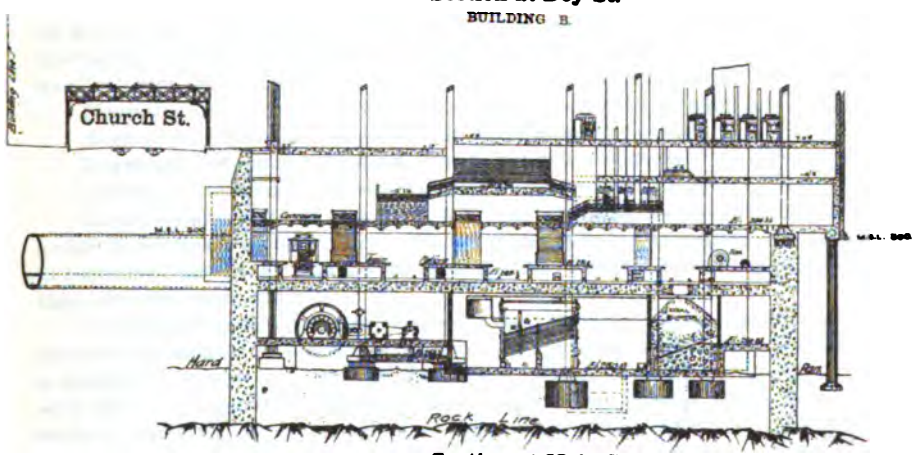
To ascertain the necessities in respect of stairs and passages, count of actual



TRACK LEVEL, HUDSON AND MANHATTAN TERMINAL, NEW YORK.



Section at Dey St.
BUILDING B



Section at Main Stairs
BUILDING B

Hudson & Manhattan R. R. Co.
CHURCH ST. TERMINAL
Sections Looking South.

movement of traffic at congested points in New York was made, notably at the Brooklyn Bridge. In a straight passage of ample width the "rush hour" New York crowd moves at the rate of 300 feet per minute, walking with a step averaging thirty inches. There is only a small reduction in this speed on ramps of, say, not over 10 per cent. grade. At this rate each person averages about ten square feet space occupied and the movement discharges about thirty persons per foot of width of passage. If the passageway becomes too congested the space occupied per person reduces and the speed of movement also reduces, but the number discharged remains about the same, thirty per minute. Any contrary movement in a broad passage reduces the movement rather more than the relative space occupied in multiples of say thirty inches per person, but in narrow passages the relative reduction is much greater, notwithstanding that persons crowd into smaller space, not over twenty-four inches width.

A crowd moving freely upwards on stairs takes about the same number of steps per minute, say 120, but advances only about twelve inches horizontally instead of thirty inches. Upstairs movement is much more dense than downstairs, but correspondingly slower. We have counted discharge on stairs of twenty-four persons per foot of width per minute moving upward, but never more than eighteen per foot of width moving downward. There does not appear much difference in discharging rate on stairs above four feet wide if the movement is all in one direction, but stairs of all widths (particularly below eight feet wide) are seriously impeded by any contrary movement, even when only four or five persons per minute are moving in the direction reverse to the heavy traffic. Generally, for stairs above four feet wide, all movement in one direction, actual count indicates:

Upward.—Maximum twenty persons per foot of width of stairs per minute. Average for ordinarily free moving crowds, fifteen per minute.

Downward.—Maximum eighteen persons per foot of width of stairs per minute. Average for ordinarily free moving crowds, thirteen per minute.

In case of any contrary movement it is most important to force the people to a right hand direction of movement, and, speaking generally, no stairs serving traffic in contrary directions for railroad service should be permitted to be installed of less than five feet clear width.

In unloading railroad trains in rapid transit service it is very important to distribute passengers as quickly as possible, particularly in discharge, and in such a problem as ours to get them off the track platforms as rapidly as possible and with the least amount of walking along the platforms, allowing them the more easily to freely distribute themselves on the great concourse floor. In a full train there are, say, twenty door openings in the train, all simultaneously discharging practically a single line of persons. Therefore, we located stairways on all the unloading platforms in tandem, six stairs to each, distributed as nearly uniformly along the platform lengths as possible. No. 1 platform has an aggregate of 26-foot stairs to discharge at the rate of 800 persons in a three-minute interval, or 266 persons per minute, or, say, ten persons per foot of width of stairs. No. 3 platform

has six stairs (one not fitted until needed) aggregating 48½-foot width for discharge of 800 persons in ninety seconds, or, say, nine persons per foot of width per minute.

For the loading platforms it was important for the economical operation of the railroad to group the landings on the concourse floor, and consequently it was necessary to provide for this service only four stairs per platform in pairs. These have an aggregate width of 32½ feet and maximum passenger movement of sixteen persons per foot of width per minute, on the assumption that the train is fully loaded at the terminal station and no consideration given to local movement at other stations.

The arrangement of stairway heads on the concourse floor tends as far as it is possible to thoroughly distribute the movement and also to separate the incoming from the outgoing traffic. The distribution of the streams of traffic cannot be too thoroughly separated to obtain the best results. At the same time, having in mind that when the movement eastward is at its maximum and carrying 7.5 per cent. of the total daily traffic between 7.00 A. M. and 8.00 A. M., the westward movement is only 1.5 per cent. of the total daily traffic, and in reverse direction when between 5.00 P. M. and 6.00 P. M., the maximum westbound traffic represents 10.7 per cent. of the total daily traffic, the eastbound traffic only represents 2.5 per cent. of the total daily movement.

The original plan designed was to absolutely separate the movement on the street by making two main entrances on Dey Street near Church Street, each thirty feet wide, the entire entrance for all the traffic descending by arcade passages and easy stairs to the concourse, and one main exit each at Cortlandt Street and at Fulton Street, each thirty feet in width, and ascending by arcades and easy ramp sloping from .10 per cent. to 14 per cent. from the concourse. As, however, the aggregate of these main entrances provided for less than nine persons per foot of width per minute and the office buildings were greatly benefited by making all these main approaches equally entrances and exits, the first plan was modified to that extent and the freedom of movement is much better adapted to the general approach through the streets to the station and reduces thereby the general congestion on the streets.

The first essential purpose of this railroad and station is for the operation of a purely local, rapid transit passenger service, but, as before stated, the railroad was to operate a terminal service for the various steam railroads in Jersey City and Hoboken. It was, therefore, also necessary to equip the concourse floor with ticket office for these various trunk line railroads, enabling them to sell all classes of tickets for all points on their systems for trains departing and to advertise schedules of trains departing from Church Street Terminal. A train leaving at an advertised time becomes the train connection for the specified steam railroad train from New Jersey. The ticket examiners at the ticket barriers on the concourse floor announce the train connection and at the leaving time of the train deliver a clearance ticket for the train to the conductor, who in turn surrenders the clearance ticket to the platform man at the respective stations on the New Jersey side, on receipt of which ticket the main line train is despatched.

STAIRWAY FROM TRACK FLOOR TO CONCOURSE.

The construction and design of this combined station and office building needs a very brief description. The structure below the surface is the greatest example of caisson construction in existence. The soil underlying the site was quicksand down to the level of the hardpan, which was an irregular deposit overlying the bed rock (New York micaceous gniess). All surrounding buildings were on old and inadequate foundations and the plans for the electrical power plant to be put in below the track level required excavation to a depth of 75.8 feet below Church Street, or 50.7 feet below tide level. In addition to the building with its foundations the approaches for the tunnels to the station at either end had also to be constructed by sinking caissons under the streets and from building line to building line without interfering with the use of the streets during construction. The main station site was first enclosed by sinking fifty-one rectangular caissons, jointed to each other, around the external lines. All these caissons are of reinforced concrete eight-feet thickness of wall, and all caissons were sunk through hardpan to bed rock and sealed into the rock. Rock at its deepest point is 110 feet below the surface of Church Street. Inside the area of the enclosed cofferdam were then sunk 115 circular pits and thirty-two rectangular pits, in caissons down to hardpan, these pits corresponding to each column location, and in these pits were constructed the grilleges and foundations for columns. Up to this point excavation had only been carried down to about the concourse floor level where water stood in the ground. The steel columns for the triple tier from foundation to street floor level were then erected in these pits; the lower length of column weighing as much as twenty-six tons each and carrying loading up to 1,725 tons per column. The columns being erected, the steel of the concourse floor was then erected and the floor filled with solid Portland cement concrete from wall to wall. Excavation was then carried down to the train deck. From that floor the main girders on rectangular system between columns were forty-eight inches deep, flanges sixteen inches wide. The floor had to carry the train loading as well as to be the main strut to carry the external pressures on the external walls. It was, therefore, determined to construct this of excessive mass and strength by putting in a solid slab, thirty-six inches thick, of reinforced Portland cement concrete, burying columns and girders in one continuous mass. The enormous external pressure may be appreciated from the fact that during excavation from the concourse to the train floor and while waiting for steel girders to be delivered, the entire wall along Church Street bowed in ten inches without crack or apparent injury.

After the track floor construction was complete excavation was carried down to the bottom. The bottom of the railroad's transformer sub-station No. 3 was excavated down into bedrock. The entire balance of area of basement had all quicksand removed to hardpan or rock and the area backfilled with boiler cinders and thoroughly sub-drained to the sump where automatic ejectors are installed. Since construction it is found that the entire drainage through the walls and into the foundations is insignificant and negligible. To construct this basement it was necessary to build the cofferdam continuous, but at the same time the approaches

under Cortlandt Street and Fulton Street were also being sunk in caissons connected end to end with removable steel end walls used only for sinking purposes, and these approaches involved thirty-three caissons having a total cubic capacity of 25,000 cubic yards. These being sunk to final grade, sealed, roofed, and in every way made secure, the trainways through the main cofferdam walls were blasted out. This was a most difficult job, executed while the office buildings were fully occupied. The trainways represented 120 feet of regular railroad tunnel. The total quantities involved in work below the street level, as illustrating the magnitude of the undertaking, were as follows:

238,000 cubic yards excavation.
80,000 cubic yards excavation in caissons.
11,000 cubic yards concrete in caissons.
6,267 tons structural steel.

In the basement of the buildings is the following equipment:

Electric transformer sub-station transforming current generated in Jersey City power house, transmitted at 11,000 volts A. C. to current at 625 volts D. C. for the railroad operation and 240 volts D. C. for the power and lighting of the buildings.

A complete school of instruction for railroad employees, fitted with a full size car and signal equipment.

Club, reading and dressing rooms for employees.

Suction and forced draft fans for tunnel ventilation, and also smiilar machinery for ventilation of the basement and the buildings.

Absorption ice making plant (Carbondale type) for clubs, restaurants and markets.

1,500 horse-power boiler power plant (Babcock & Wilcox).

Isolated generating plant for operating entire buildings.

Storage battery plant.

Hydraulic pumps for all baggage elevators.

Extensive baggage rooms and space for handling and storage of baggage or freight.

Coal bunkers, capacity 1,500 tons, constructed of reinforced concrete.

In addition to the local passenger business of the Hudson and Manhattan Railroad, it is obvious from the foregoing descriptions that the railroad is also laid out to be the distributing terminal for the steam trunk lines terminating in New Jersey. This is anticipated in the fact that the Company is now constructing a physical connection to the tracks of the Pennsylvania Railroad so that its electric trains can be run over the tracks of the Pennsylvania Railroad from the suburban district in New Jersey into the tunnels of the Hudson and Manhattan Railroad either to the Church Street Terminal or untimately uptown to Forty-second Street, Grand Central Station. Further than this, a connection is anticipated for the future from the Erie Railroad direct to Church Street Terminal. It is, therefore, necessary that the bag-

VIEW UP CORTLAND RAMP.

gage of passengers to and from the steam railroad connections must be handled at Church Street Terminal as well as at the uptown terminal.

The baggage proposition in connection with Church Street Terminal involved quite serious difficulties owing to the fact that the track layout of the terminal necessitated island platforms between tracks as heretofore described. In the operation of the railroad it was perfectly feasible to arrange to handle the baggage car at either the front or rear of the trains, but this could not be arranged uniformly owing to the fact that in handling baggage from the Lackawanna and Erie Stations the baggage car should be on the rear of the train while from the Pennsylvania Station it should of necessity be at the front. During the busy hours of the day any baggage must be handled in solid baggage trains, whether in one or more cars, such train occupying unit places in the tunnels the same as the regular passenger trains, as any delay in handling baggage must on no account delay the movement of passenger trains, but at other hours of the day it is quite feasible to attach a baggage car to one end or the other of a regular passenger train. In this case the baggage car might come to Church Street Terminal at either the rear or head of a train and provision had to be made for access to all tracks served by platforms as it cannot be foretold to which platform it will be necessary to run the baggage car. To obtain promptness in the handling of baggage it is essential that no baggage should be handled in bulk on the tunnel trains. To meet these conditions it was first necessary to design a flat baggage car with simply a roof and fitted with stalls, and also to design a baggage truck with very small wheels on to which trunks and other baggage can be loaded in the baggage rooms, wheeled into the baggage cars, and on arrival of the baggage cars at destination the baggage trucks loaded with baggage are to be wheeled from the cars on to the platform. This operation may be executed very quickly, thus permitting the train to proceed.

The operation of these baggage trucks or the handling of baggage in bulk on the concourse floor of Church Street Terminal would have introduced a condition which would have been very detrimental to the use of the concourse floor and would have obstructed very seriously the movement of passengers. The only alternative was to take all baggage as soon as delivered at the Dey Street entrance to the terminal by chute down to a baggage room on the concourse floor immediately adjacent to the ticket offices of the steam railroads, and on the purchase of a railroad ticket by a passenger his baggage can then be readily and conveniently checked to destination. This is also applicable to the checking of hand baggage brought to the station by passengers. In the case of baggage checked from the residence or hotel through to destination the baggage does not go to the concourse floor at all, but is handled by baggage elevators to the basement floor below the track level, and the same elevators by stopping at the baggage room at the concourse level also handle the baggage from this baggage room to the basement. For this service there have been equipped two very large baggage elevators having a lifting capacity of 13,000 pounds. These elevators are the Otis plunger type with a ram twelve and one-half inches in diameter, and the lift from the basement level to the concourse level is thirty-five feet, six inches.

The platform of these elevators is fifteen feet eight inches by eight feet three inches each. These elevators also serve to handle freight and supplies needed for the engine rooms on the basement floor. This arrangement brings all baggage into the very large area in the basement reserved for baggage at Church Street Terminal. At that point it can be assorted for destination, or if necessary stored, as there is a very large area available for the purpose.

For the subsequent handling of this baggage there are four elevators of the Otis plunger type, the floor area of each averaging twelve by six feet; these elevators are equipped with rams nine and one-half by twelve and one-half inches in diameter and have a lift of twenty-three feet; capacity of the elevators is 8,000 to 13,000 pounds. One of these elevators is installed at each end of each of the loading platforms, and the main Dey Street baggage elevators serve the No. 6 platform by a door opening on to that platform direct. The means is, therefore, provided for getting baggage on to each or any one of the platforms serving the five separate tracks at either end.

At the present time the baggage service has not been inaugurated as the agreements with the steam railroads for the handling of baggage have not yet become effective, but all provisions for the service have been made in the design and construction.

The development and use for railroad purposes of the space below street level only, allowed of the full treatment above the surface of almost the entire area. This very great area permitted the design of office buildings on strictly economical lines which would be noteworthy and handsome if for no other reason on account of their enormous mass and simplicity.

There are two of these buildings, each twenty-two stories in height above the street, the combined cubical contents of which are approximately 15,000,000 cubic feet. Both of these superstructures were so designed as to have easy access from the elevator halls to the concourse floor below.

The Sixth Avenue elevated station at Cortlandt Street connects with the corridors on the third floor of the building on Cortland Street and the twin buildings are connected by a bridge on this floor crossing Dey Street.

There are thirty-nine (39) high speed one to one traction elevators; twenty-two (22) of which are express elevators running to the twenty-second floor, and seventeen (17) local elevators running to the eleventh floor. Three of the elevators run down to the concourse floor, but are not at present used except in cases of emergency.

The rentable area of the buildings is approximately 815,000 square feet, exclusive of the valuable rental space on the entire concourse floor.

In order to construct these buildings enormous quantities of materials were required; there are approximately 17,000,000 bricks above the surface of the ground and in the sub-structure and super-structure combined there are 27,000 tons of steel.

There are four entrances to the railroad station, or concourse floor. The approaches on Cortlandt Street and on Fulton Street are by means of ramps, and the two on Dey Street by means of stairways.

These approaches are very simple in design and all around are arranged with shop windows.

ENTRANCE FROM CONCOURSE TO TRACK FLOOR.

At the ends of these approaches are four large clock panels designed by Mr. Carl Bitter.

Steel and glass marquises cover the entire width of the sidewalk over all entrances.

The floors of the ramps are of cement mixed with carborundum so as to avoid slipping. The stairways are of blue stone.

All renting spaces are designed on a strictly commercial basis and the entire station, including the concourse floor and the railroad platforms, are built so as to be as nearly sanitary as possible.

The floor of the concourse is of white terrazza with colored mosaic bands, and all walls and columns have a white glazed terra cotta wainscoting with sanitary base and decorative cap of the same material.

The walls above the wainscoting are of hard plaster; all angles are coved or round, and the entire plaster work is painted with enamel paint.

On the concourse floor every convenience of the modern terminal station is provided for the public and every effort has been made to make it attractive.

This floor is approximately 430 feet long by 185 feet wide, and of this space aisles, which approximate a total of 100 feet in width, are given up to the public with ticket booths arranged at convenient points, giving an unobstructed view of the whole length of the floor.

On this floor, in addition to the ticket offices of the Hudson and Manhattan Railroad Company, are the ticket offices of the Pennsylvania, Erie and Lehigh Valley Railroads.

There are ample waiting rooms with first class toilet accommodations, baggage and parcel rooms, barber shops, boot blacks, telephone and telegraph booths and shops at which nearly everything that the commuter requires may be purchased.

This combination of a railroad terminal and of an office building above, presented problems which would not arise in the case of either proposition if handled by itself. The most serious of these is the arrangement of the columns so that as far as possible they would allow of a proper architectural treatment of the buildings and still maintain the right of way of the tracks in the sub-structure. This was accomplished in the main body of the plot, but at the Cortlandt and Fulton Street ends, where the tracks converge to run down the streets, it was found necessary to have the building columns rest on girders, which were carried by columns extending through the track floor, which columns were located so as to leave proper clearance for the tracks.

The distributing girders were placed at the concourse floor level and are made up of three single girders, each seventy-two inches deep and with a flange width of ten inches, and as these girders when set up were very wide, and it being almost impossible to design proper caps for the columns which supported them, mill slabs of steel were used; these were in some cases six inches thick.

Another point which had to be taken care of was the multitude of pipes and wires which were necessary to connect the building above the track and concourse floors with the power and heating plants, which were located below these floors, particularly bearing in mind that the passage through the track floor must not by

any connections obstruct more than possible the space occupied on platforms. This was accomplished by connecting up groups of pipes or wires into a system of piping which for convenience were termed sub-mains, which sub-mains were in turn connected to the mains in the basement by means of large vertical risers terms sub-main feeders. By this means the amount of room required for piping and wire shafts was reduced to a minimum, and as these are usually placed near columns the size of the finish around columns was reduced quite materially and thereby unnecessary obstruction of the track platforms was avoided.

These sub-mains were placed near the concourse ceiling, and to make proper finish for the concourse a hung ceiling was erected under same with trap doors for easy access to the control valves.

The entire lighting of the buildings and sub-structure is by means of high efficiency lamps and specially designed fixtures.

The location of these twin buildings in conjunction with the railroad station terminal has created a new center of population, where previously only a small community was gathered. The present aggregation of persons transacting their daily work under these roofs is 8,000, and with the complete rental of all space will amount to approximately 10,000.

The property was purchased in the early part of 1906 and some few buildings standing thereon were razed at that time. It was not, however, until May 1, 1906, that the bulk of the properties were turned over to the Railroad Company. The Company, by its own engineers, carried out all work of construction of the railroad station, approaches, foundations and sub-structure below street level. The caisson and foundation work had advanced so that on May 12, 1907, the first grillage and column were set in the permanent structure and on April 4, 1908, the Company moved into its offices in the completed building. The completion of tunnel approaches, tunnels and terminal station, however, took considerably longer, the railroad going into operation July 19, 1909.

The design and construction of tunnels, station and sub-structure were by Jacobs & Davies, Engineers of the Company, while the entire design of the buildings and treatment and decoration of the station was by Clinton & Russell, Architects. George A. Fuller Company was the contractor for the buildings. [Applause.]

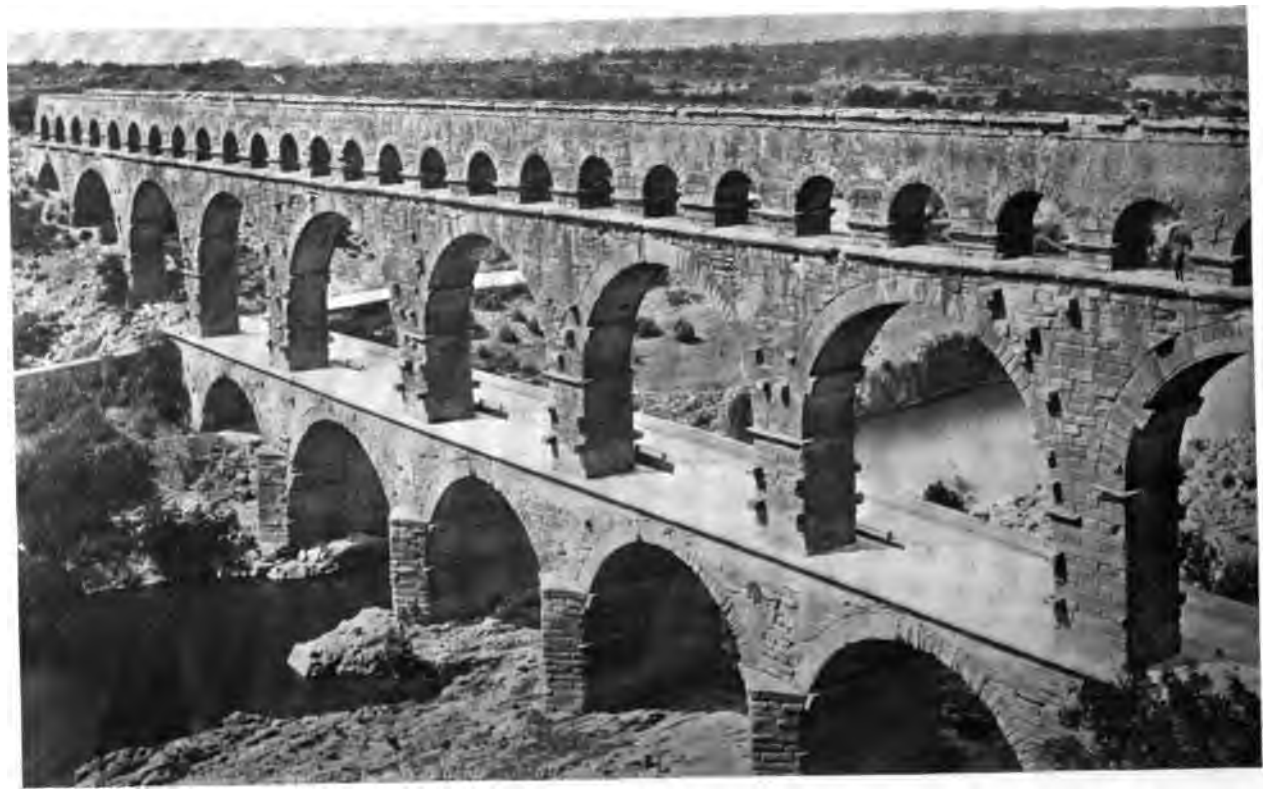
The President: You have heard the very admirable paper of Mr. Davies and Colonel Wells. Is there any comment desired to be made by members of the Institute?

Mr. Barber: I move that a vote of thanks be extended to Mr. Davies for his very interesting and inspiring paper.

The question on the vote of thanks was then put and carried unanimously.

The President: I will ask Mr. Rockart now to take the platform and to read his paper on "The Relation of Buildings, Retaining Walls

RAILROAD TICKET OFFICES ON CONCOURSE.



PONT DU GARD, NEAR ARLES, FRANCE.

and Bridges, and Their Surroundings to City Development and Beauty," in collaboration with Mr. I. D. Waterman and Mr. C. W. Lord.

I have the honor to introduce Mr. Rockart. [Applause.]

THE RELATION OF BUILDINGS, RETAINING WALLS AND BRIDGES, AND THEIR SURROUNDINGS TO CITY DEVELOPMENT.

JOHN R. ROCKART, ARCHITECT; I. D. WATERMAN AND C. W. LORD, ENGINEERS, NEW YORK, NEW HAVEN AND HARTFORD RAILROAD.

Most cities have grown from natural causes. A need has arisen and in the process of time has been filled. A ford, a port, a waterfall, the junction of caravan routes or some crag defending the approach to a mountain pass has become the center of a permanent community for commerce or defense.

Some of these cities have filled a permanent need, have withstood the changed conditions of civilization, by reason of their natural environment and by the energy of the population; others under changed conditions have dwindled away and finally disappeared.

There are other towns and cities which have grown by artificial causes. The railroads, in extending their territory of operation, have located towns for practical reasons, these planned in some instances with great care and forethought.

The location of other cities has been selected deliberately by Legislative enactment. A number of the capital cities of western States—Madison, Wis., for instance—and the city of Washington are notable examples.

With the growth and development of a country, the railroads have likewise developed. Being primarily a commercial enterprise and constructed particularly for profit, the initial cost of construction and the natural conditions and topography of the country traversed were important factors in determining the right of way.

Their entry into a city was usually made along the line of least resistance and to the most convenient points and which then best fulfilled the needs of the community. This is particularly so in instances of old cities where the railroads have been built since they became important factors in modern civilization.

In the central part of the United States, in Canada and in recently settled portions of South America, locations were fixed with regard to future permanent construction and every effort used to reduce cost of temporary construction, using short, temporary lines around and over tunnels, avoiding sections of heavy work, with the idea of revising the lines at some future time and doing so as economically as possible.

Instances are known where the temporary location has become a fixture—the city developed in such a manner, precluding any later change. A particular case may be cited of a central western city, where the lines abutting a river were used as a distributing medium from the river traffic to the country adjacent.

The receding of the water level finally reduced the river freight to an unimportant quantity and left the tracks at a level so low that within the city limits the

grades of tracks were considerably in excess of grades in the mountain sections farther west.

Had the roads been built to enter the city at a higher elevation, which was possible, the whole development of the city would have been different and the excess of grades eliminated, a consequent saving of operating expenses.

It is stated that in the United States 50 years ago a small percentage, not more than three per cent., of the population lived in cities; the majority of the population lived in the small hamlets or in the country.

To-day nearly a third of the population in the United States is found in cities of over 8,000 inhabitants—about ten per cent. of these live in New York, Chicago, Philadelphia, Brooklyn, and Boston, and this percentage is increasing.

It naturally follows that in a city which grows and develops there comes a time when the old streets and buildings are found inadequate for existing conditions and requirements, when streets must be widened, new ones built, and when public buildings having outgrown their utility must be reconstructed, enlarged, and in most cases replaced by new and modern ones.

In order that these improvements result to the best future advantage, a definite plan of improvement should be developed.

All growing cities should have a civic plan. Not to create a city beautiful as has been erroneously impressed upon the mind of the public, but a city practical, good streets, good sidewalks, well lighted, well sewered, well guttered—a civic city with good substantial buildings.

Cities have not been located because the site was beautiful, but because they were the natural points for commerce or defense. All great cities of modern times are great by reason of their commerce.

Venice was not built to be the city beautiful. It took 1,000 years to build it and it will take another thousand years to destroy its beauty. Venice was built primarily on its location for defense. Later it found itself, by reason of natural advantages, the center of a great commerce.

Of recent years the question of civic improvement has been discussed at great length—given its impetus from the Chicago World's Fair. Those who visited Chicago then will not forget the splendid Court of Honor. It had its effect and impressed all as an invaluable object lesson.

The improvement of the city of Washington—encouraged and in fact fathered by the American Institute of Architects—following soon after the Chicago Fair too, made its impression upon the public, so much so that following these, in cities all over the United States, this question created great interest and enthusiasm.

The improvements in Paris inaugurated by Napoleon III and carried on under Baron Haussmann's direction, served as a valuable object lesson and precedent.

Improvement commissions have been created, experts employed, and vast sums of money spent in the development of schemes for the improvement and betterment of living in what are now congested and unhygienic communities.

The public are awakening to interest in civic improvement.

BANHOFPLATZ, HANOVER, GERMANY.

In all these cases the railroads, the main arteries of communication and transportation between communities, have played an important part.

The question arises—may not practical impetus be given to this movement and something done to improve railway terminals, stations, yards and approaches?

By virtue of their important function as the medium of access and egress to and from a city, to so establish relations whereby the railroad improvements will become component elements in the development of the city practical and incidentally the city beautiful.

A city in its relation to railroads can well be compared to a large business establishment where convenience of access and circulation to the several departments is most essential and important for economic reasons.

Entry and exit from and to the establishment must be so planned that its machinery be run economically and expeditiously. So the city's export and import trade and its passenger service depend on the railroad's facilities to promptly handle its trade.

The principal elements of a railroad and their proper location and treatment in relation to the city—for practical and esthetic reasons, may be subdivided as follows:

The passenger station.
Proper approaches thereto.
Freight yards and buildings.
Roadbed and cuts.
Crossings, bridges and viaducts.

In the ancient times the highways led to cities and terminated in beautiful and imposing gateways which in time of war were used as a means of defense and incidentally were ornaments to the city.

With our modern civilization the railroad has practically replaced the highway, and the railroad station, in its function at least, has practically replaced the gate.

Its relation to the improvement of cities has been found most important.

In many instances the station location being determined by reason of the fixed location of the tracks, the curves, the grades and yards, has influenced the scheme of improvement of a city and it always will do so.

Again in Washington, with the broad gauge view of the railroad officials it was possible to move the tracks and station.

The Baltimore & Ohio and Pennsylvania Railroads were entitled by Acts of Congress to land which crossed the site of the space known as the Mall, and unless vacated by the railroads the improvements would be impossible.

During the development of the project it was suggested that the Baltimore & Ohio and the Pennsylvania Railroads built a Union Station on the site at C Street granted by Congress to the Baltimore & Ohio Railroad—the five southern roads to reach this location and building by means of a tunnel under Capitol Hill.

This site was finally found inadequate and, besides, would require a long shed extending over Massachusetts Avenue.

The Railroad Companies' officials, appreciating the importance of the project, agreed to withdraw their claims to the right of way and finally the tracks and station were moved. The station located on the axis of Delaware Avenue about a quarter of a mile from the Capitol.

The attitude of these railways was public spirited and most admirable in the matter. They gave up their location eminently fitted for their business and at enormous expense moved their tracks, erecting a station where it was finally placed and, it was so stated, for no other purpose than to help in the success of the project.

In the Cleveland group plan of public buildings the Board of Supervisors, after determining the location of the Mall, giving due consideration to the railroad, encountered difficulty in treating the end of the Mall at the lake.

The natural solution, in their judgment, with the lake as a background, was an upper and lower park treated with ramps, approaches, fountains and statuary, a playground and an open esplanade, requiring a tunnel for the railroads under the esplanade of unusually great length.

The railroad tracks and particularly the freight tracks, the yards and many trains, were found to seriously interfere with this solution. The expense and cost of maintenance of the Park seemed prohibitive and this scheme was finally modified.

The Board, looking wisely into the future, determined that the railroads would in time require more room, in consequence of increased traffic and freight demands, and a park on reclaimed land would in time of necessity be required and condemned for railroad purposes. These objections to the park solution were found and on account of the curves on one side and grades on the other, preventing the placing of the railroad station elsewhere, the Board determined to locate the station in the center of the scheme as an important element of the improvement.

In this particular case the station might be said to be the focal point in the composition more so than the station in Washington.

A similar instance where the station is an important point in the composition, is obtained in the proposed improvement of the city of New Haven, Conn.

Practical railway conditions such as length of trains, the curves and grades, a slight elevation at the station platform to facilitate starting and stopping of trains and providing accommodations for the branch roads with long, straight sidings on the city side, determined the location of the station.

After careful study, with one end the axis of the Boulevard fixed by the station, it was possible to develop the improvement and determine the line of the main avenue from the station to the center of the city.

The railroad station has well been called the vestibule of the city. It should be located within easy and convenient access to all parts of the town. The circulation to and from it should be ample, through wide streets and avenues, so that visitors passing through will enter at once into an attractive section and thus obtain a pleasant impression which reacts as a lasting and substantial benefit to the city.

The Gare d'Orleans in Paris, one of the most successful railroad buildings, particularly in plan, is most happily located on the Seine.

CASS GILBERT,
FREDERICK LAW OLMSTED,
Improvement Commission.

PLAN, NEW HAVEN IMPROVEMENT.

CASS GILBERT,
FREDERICK LAW OLMSTED,
Improvement Commission.

NEW HAVEN IMPROVEMENT, PERSPECTIVE.

The visitor emerging from the station, on the river side, obtains a view of the Louvre, the gardens of the Tuileries and Place de la Concorde, the most interesting section of the city.

In addition, however, to convenience to traffic and to the propriety of the plan—the placing of an ample open square in front of the building is to be strongly commended.

If the theoretical desirability of treating a station as a city gate is to be urged on the architects, clearly the city itself should be induced to provide such a place to emphasize the importance of a station.

Such an arrangement would place the open space before the building and further serve as a convenient center for the convergence of the traffic.

That it be treated in some form to help make it an artistic and dignified entrance to the city is obvious.

Some years ago the city of Genoa, Italy, set itself to improve the space in front of the railroad station. It placed an imposing statue of Columbus there and in surrounding this with turf and flowers, it did so "in order," as the Genoese authorities frankly declared, "that the first impression of strangers coming to our city may be favorable."

Where the available area is very large in proportion to the travel across it, which in great cities cannot be often, the practical problem is rather that of making the esthetic best of a probably difficult situation, than a deliberate attempt at gardening.

Most European cities have given importance to the station plaza and the treatment of some could well serve as profitable models for study.

In the Banhofplatz or station place in Hanover, the city has displayed her fondness for esthetic development and the space, semicircular in form, is treated very successfully—the central part of which is laid out in the form of a garden and decorated with statuary.

Another successful example is the square in front of the Eastern Railway Terminal, Budapest, Hungary.

In the cities of the United States, the plaza is most conspicuous by its absence and even where, as in the new South Terminal at Boston, an open space had been provided, all lessons of modern city building were ignored. The space has been ruined by the erection across it of an ugly elevated railroad.

The imposing facade of the new Pennsylvania Station in New York City is, one might say, totally hidden except for the very limited view obtained through the narrow street approaching the central entrance.

The importance of the station and architectural merit of the building make it seem unfortunate that it could not have a proper setting.

What has been accomplished in European cities should be realized in the United States; in fact in Washington the station plaza is assured and will serve as a valuable object lesson.

In front of the new station, whose white granite facade is some 760 feet long,

a public plaza has been planned 600 feet wide by 1,200 feet long, ornamented with extensive terraces, basins, fountains and gardening—a setting of ample dimensions and design commensurate with the importance of the building.

The proposed plan for the improvement of the city of New Haven suggests a space in front of the new station semicircular in form, laid out in manner similar to the station place in Hanover. Here the center of the space has been left unobstructed to admit of more ample circulation.

From this plaza it is proposed to cut and develop a new avenue leading to the center of the city, past "Temple Square" to the historic "Green."

In the proposed grouping of public buildings in Cleveland, the plaza abutting the station bridges over the tracks and is flanked on the two sides by monumental screens. Thence the plaza is extended in width into an esplanade, the monumental screen continued and with three rows of trees added so as to partly hide the view of the lake.

The screen is suggested as a covered way for foot passengers.

From the esplanade the extension forms into a Mall flanked by buildings, which it is hoped will be restricted as to character and design—the whole composition to form an attractive approach to the city.

The first steps to realize the plan of improvement has been the completion of the Federal Post Office on the site fixed by the scheme of improvement.

It is hoped the railroad will assist the project and build the railroad station, as planned.

The embellishment of stations, station grounds and right of way of railroads first began on the Boston and Albany and the Pennsylvania lines. It is now a feature all over the country and adds immensely to the pleasure and comfort of travel. It is hoped the work will be carried on in greater measure, especially within the limits of cities.

Where cuts occur and width permits, a simple treatment of sodding and seeding the sloping terraces and the addition of trees would obtain a natural effect—after all, the best solution of this problem.

Some interesting examples are located along the Pennsylvania Railroad—one just outside the limits of Jersey City, N. J., where even the boulders, too heavy to be moved, are left exposed, adding greatly to the natural effect of the cut.

Where width of right of way is limited—and the full area is required for tracks—the construction of retaining walls and the curve of masonry lining the sides may be developed into a very interesting feature.

In New Haven, the improvement of the cut was commenced some years ago when the clearance for increased height of rolling stock made the changes necessary.

Some thirteen or fourteen of the city's streets pass over this depression. The old bridges barely cleared the usual run of cars by a few inches, and frequently larger cars had to be sent around by indirect routes to reach their destination. The approach from streets to bridges was only by means of unusually steep inclines.

The westerly portion of the "Cut" improvement is in the neighborhood of the wholesale district of the city, where heavy trucking and congested street traffic are

"THE CUT," FOR NEW YORK, NEW HAVEN & HARTFORD R.R. CO., NEW HAVEN, CONN.

LE PONT DE LA CONCORDE ET DE LA CHAMBRE DES DÉPUTÉS, PARIS, FRANCE.

VIA

most frequent and consequently the grades approaching the bridges had to be adjusted to ease off the inclines—and the cut depressed accordingly.

The cut was also subject to inundations, especially in times of high water and heavy rains, being in close proximity to the harbor front and in elevation a little above high water level of the sound.

By means of the sub-surface drainage it was possible to depress the cut sufficiently to reduce the inclines to the bridges and obtain increased headroom for rolling stock.

Both steel girder and concrete bridges were built. In consideration of the increased width of the right of way granted by the city, the New York, New Haven & Hartford Railroad constructed a parallel roadway adjacent to the cut.

A line of cars then occupying a parallel street, too congested with traffic, was deflected to this roadway. Unfortunately this roadway does not extend the full length of the cut but occurs only in the section illustrated.

The series of arcaded sections under the parallel roadway serve as freight entrances to the mercantile establishments located there.

The abutments for all bridges and the retaining walls are of concrete (the arches being reinforced).

The improvement is a commendable piece of work—unfortunately marred by the box-like effect and absolute lack of architectural appearance of the buildings.

Assuming a river bed as a railroad cut, if such an assumption is permitted, compare the view of the New Haven Cut with a section of the Seine in Paris. It is at once apparent that in New Haven there exists an opportunity to improve the section and make it an attractive feature of the city.

Another picture of the Seine showing a closer view of the bridge connecting the Place de la Concorde and the Chamber of Deputies as a suggestion for a simple and dignified design of bridges.

In case of elevated roads, several good examples of railroad viaducts have been built in the United States. There is no reason why they should not be architecturally attractive and of practical value for the space under them could be utilized to good advantage. Such structures could well be similar in appearance to the old Roman aqueducts, and very much in appearance as the viaduct spanning the Seine in Paris in the Anteuil Section.

SUBURBAN STATIONS.

As a rule the general aspect of our suburban stations is not pleasant; they should be bright, cheery and inviting. A delightful station conduces to cheerfulness while a shabby or neglected one produces the opposite effect.

Within the limits of the city of New York the New York, New Haven & Hartford Railroad has built branch stations, some of which present an unusual problem.

The station at Hunts Point built upon a street bridge widened to obtain area sufficient for the station itself, and at Westchester Avenue where part of the station rests on solid ground and the major portion elevated over the tracks. In this

station that portion on solid ground was designed in more solid form; the elevated portion to harmonize with the steel substructure.

Port Morris, an example of a station built against an elevated road entered at street level, the entrance to trains being at the upper level.

FREIGHT.

The future prosperity of a city depends on the railroads. The greater number of roads reaching a city, the greater prosperity and a consequent increase in its commerce.

To handle freight with despatch and at the lowest cost is the most important factor in the development of the city and the railroads.

To bring freight in car lots direct to the unloading platform of a warehouse of a mercantile establishment is a necessity, for economic reasons. This evidently cannot be accomplished by the improvement of main lines, freight yards and houses, nor by surface lines penetrating the heart of a town, as in New York City where life and property are menaced as is the condition there to-day.

Expert improvement commissions have studied this problem only in a general way, to attempt a solution of a thoroughly practical and economical railroad problem, and all conclude that freight yards, where possible, be located on the limits or boundary of a city, and where the distance to the warehouses is great or the demands exceptional, by means of an underground system of tunnels such as now exist in the city of Chicago, bringing the freight in carload lots direct to and from the shipping and receiving platform of the warehouses.

Where more than one railroad enters a city the suggestion has been made, and that by those interested in the "Chicago Plan," that a central freight terminal or transfer be established at a point most economical for all roads, from which the freight may be transferred to the proper underground channels.

COAL VERSUS ELECTRICITY.

One of the crying needs in reform is the elimination of the smoke nuisance, a menace to the health and the general appearance of a city.

The New York Central and the New York, New Hampshire & Hudson River Railroad have inaugurated a much needed improvement, and electricity for traction power is being used on parts of these roads and within the limits of the city of New York.

Two decades ago electricity was used as traction power for lighter traffic but only within the last few years has it been demonstrated as suitable for the heaviest traffic.

In railroad work it was first used as an aid in pushing solid trains through the Baltimore Tunnel. In 1899 it was first considered as a possibility by the New York Central, to cure the evils at the entrance to the Grand Central Terminal, but not

STATION AT HUNT'S POINT, NEW YORK CITY, FOR NEW YORK, NEW HAVEN & HARTFORD R.R. CO.

CASS GILBERT, ARCHITECT.

STATION AT PORT MORRIS, NEW YORK CITY, FOR NEW YORK, NEW HAVEN & HARTFORD R. R. CO.

CASS GILBERT, ARCHITECT.

until 1903, when the objectionable atmospheric conditions in the Park Avenue Tunnel and the congestion of traffic at the terminal precipitated legislative action, was actual work started.

In the same year the railroad company and the city agreed upon radical changes at the terminal which were possible only with the abandonment of steam. The most important of these changes was the depression of the whole terminal so as to permit the extension of the streets over the tracks from 45th to 56th Streets inclusive and the continuation of Park Avenue—140 feet wide within the same limits, thus joining two sections of the city hitherto separated for three-quarters of a mile by an impassable barrier of railroad yards and structures.

The New York, New Hampshire & Hudson River Railroad, have under electric operation about 30 miles of road and it has been demonstrated there that the cost of operation of passenger trains is more economical with electricity than with steam.

It can therefore be reasonably assumed that the substitution of electricity for steam will aid in the proper development of a city and not only that, but will be the medium of eliminating the smoke nuisance.

Mr. Boyd: I move you, Mr. Chairman, that we extend a vote of thanks to Mr. Rockart for his interesting address.

The motion was seconded, and upon being put was unanimously carried.

The President: The next feature of the programme will be a brief discussion of the subject by Mr. George Cary.

Mr. Cary then read the following paper.

THE TERMINAL IN BUFFALO.

By Mr. George Cary.

Buffalo is said to have the largest number of railroads and greatest mileage of tracks within its city limits of any city in the Union except, perhaps, Chicago.

Buffalo is likewise known as having the most inadequate and meanest stations of any city in the world.

For the past thirty years Buffalo has been trying to get a Union Station, and for this purpose the Mayor has, at different periods, appointed a Union Station Commission.

Never before has there been any unanimity of opinion on the part of the railroads in regard to a number of sites suggested.

The last Union Station Commission appointed by the Mayor succeeded in inducing thirteen railroads to sign a Union Station Report, or proposition, to the city of Buffalo.

The railroads with one opinion for the first and only time unite as a whole on the Genesee Street, or the so-called Cary, site, and made a proposition to the city of Buffalo.

Briefly it is this: That the city of Buffalo should make adequate approaches to the Union Station with parks in front, and docks reached by viaducts across the train yard back of the station.

Further, the abandoning by the State, and appropriating by the railroads, of an end section of the Erie canal which is yearly more likely to become as bad as an open sewer.

This would involve the necessary overhead crossings to a new marginal street along the water front, and along the lake to the Lackawana steel plant at the south end of the city.

This problem of reaching the steel plant, this grade-crossing question, and docks and marginal street, must be taken up as items of expense apart from the cost to the city for the Union Station, as that ought to be done wherever the station may be, or even if there should be no Union Station. The fact that the railroad would pay to the city at least an increased tax of sixty per cent. on their improvements and new acquisitions would mean over $100,000 yearly additional income to the city.

The streets closed, and the section of the canal taken by the railroads, all become assessable property, while to-day the city gets no return whatever from this property.

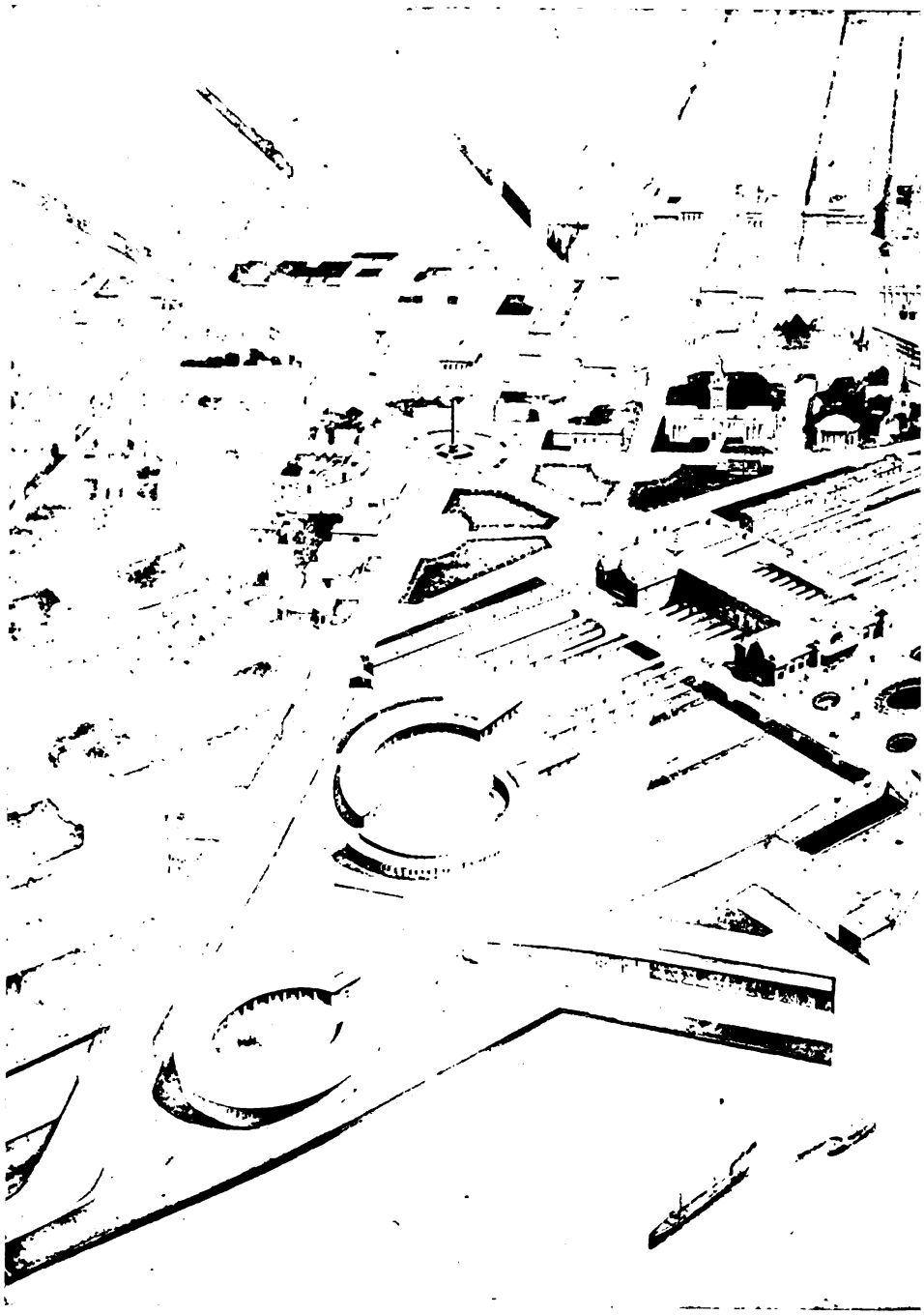
Therefore, it is a business proposition for the city to negotiate with the railroads and issue bonds for an expenditure to pay for approaches which induces a corporation to make an outlay which triples the assessable value of a locality hopelessly diminishing yearly in value. As the municipality has for the last twenty years expended little on its municipal buildings, and likewise little or nothing to acquire parks on the water front or dock facilities, it is right for it to do so, when it has the co-operation of the railroads.

The advantage to the railroads in Buffalo in securing this new site is a straight level line parallel to the water front, adjacent to factories and works bordering on the present canal.

By introducing a loop in the wide track yard, all through trains keep head on instead of backing in and out as they do now. The present stations and yards will be used for freight depots.

The railroads contemplated spending some $15,000,000 in the purchase of land, change of tracks, building of round-houses and Union Station, etc., while the city would have to spend from $3,000,000 to $5,000,000, depending on what improvements it undertakes.

Several millions of dollars would be expended by the parties locating elsewhere whose property would be purchased by the railroads, so that altogether it means an expenditure in the city of from three to five times what the Pan-American cost the community.



BUFFALO. BIRD'S-EYE VIEW OF

PLAN II. LOOKING SOUTHEAST.

This plan places the station in the most accessible part of the business center; in the very midst of publishing houses, banks, office buildings, retail shops, residences, hotels, and apartments, for they all center about this locality.

The City Hall and other municipal buildings already face the triangular site and the effort is being made to group all future municipal buildings about the parks facing the station.

Instead of having the provincial plan of one congested main street lead to the station, as is the case now, this scheme opens up all the important thoroughfares with their trolley lines converging to the hub, and about this triangle bisected by Genesee Street, radiate twenty-eight principal streets.

One of these, Genesee Street, is the center of population, and the old coach road to Rochester, Syracuse, Utica, Albany, and New York; it runs from the water front due east five miles within city limits, dividing the city into two equal north and south sections.

L'Enfant laid out the city of Buffalo, and this triangular site west of Niagara Square is in the very heart of the city. It is to-day dilapidated, and yearly has decreased in assessed value.

The 120 acres within the triangle are assessed at but $2,000,000, and some of the property within a stone's throw of City Hall can be bought at forty cents a square foot.

This site has the advantage over all others as regards the suburbs or Greater Buffalo, for, with the opening up of the northwest, and the increased trade with Canada, which is bound to come, and the increasing population of Grand Island and Fort Erie in Canada, Greater Buffalo may see future factory sites, with Niagara Falls power, on both sides of Grand Island.

A word about the water front, which is an important factor in this plan.

Within the city limits are ten miles of water front on Lake Erie and the river. The river is now cut off from the city by the railroads and the canal with its tow-paths and shanties; and the lake is separated from the city by Buffalo River and the railroads; so that no portion of the water front is accessible to-day without crossing the tracks at grade, and, except for the so-called Front at Fort Porter, no view is obtained of the river and lake.

We have there no facilities or highways for firemen, police, traffic, and people. Such a water front, aside from its value from a commerical point of view, should be, at least in part, an important factor in the beautifying of a city and in providing pleasurable recreation for its citizens.

With this plan carried out, anyone coming by water or rail must get an impression of the importance of the city by taking in at a glance the situation, for, from the plaza, the viaducts across the tracks, and the pergolas on each side of the station, would be obtained a view of the lake, river, and Canada, the parks, public buildings (in front of the station around the parks), and Niagara Square, with the McKinley monument at the apex of the triangle.

We had, and lost, an opportunity of redeeming our water front at the time of

the Pan-American. Now we have another chance. Should the city avail itself of this it would render Buffalo, through its added beauty, dignity, and power, in very truth the "Queen City of the Lakes."

A Member: I move a vote of thanks to Mr. Cary for his admirable paper.

The motion was seconded, and upon being put was unanimously carried.

The President: Mr. Cary, I have the honor of conveying to you the thanks of the Convention.

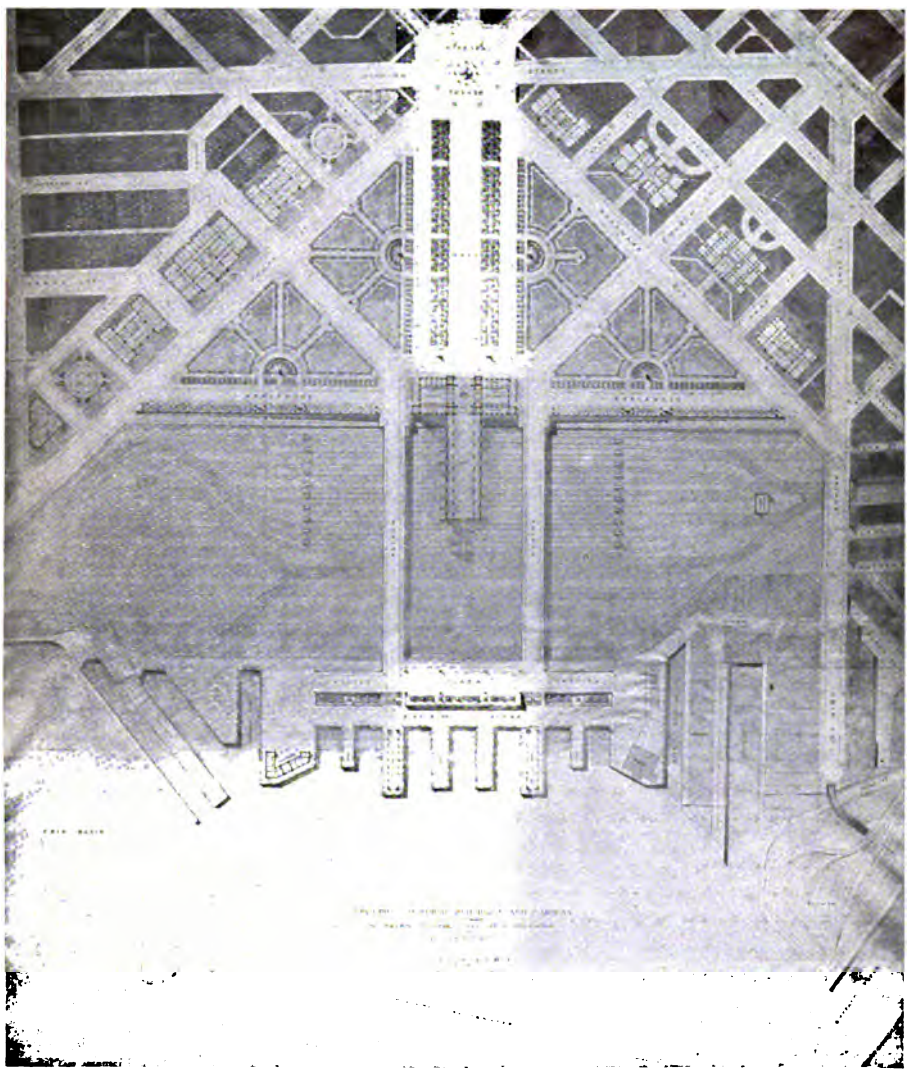
The next and last paper to be presented before the Convention on this topic is the paper of Mr. Albert Kelsey, on "Inter-Urban Stations and Trolley Traffic in City Streets."

INTER-URBAN STATIONS AND TROLLY TRAFFIC IN CITY STREETS.

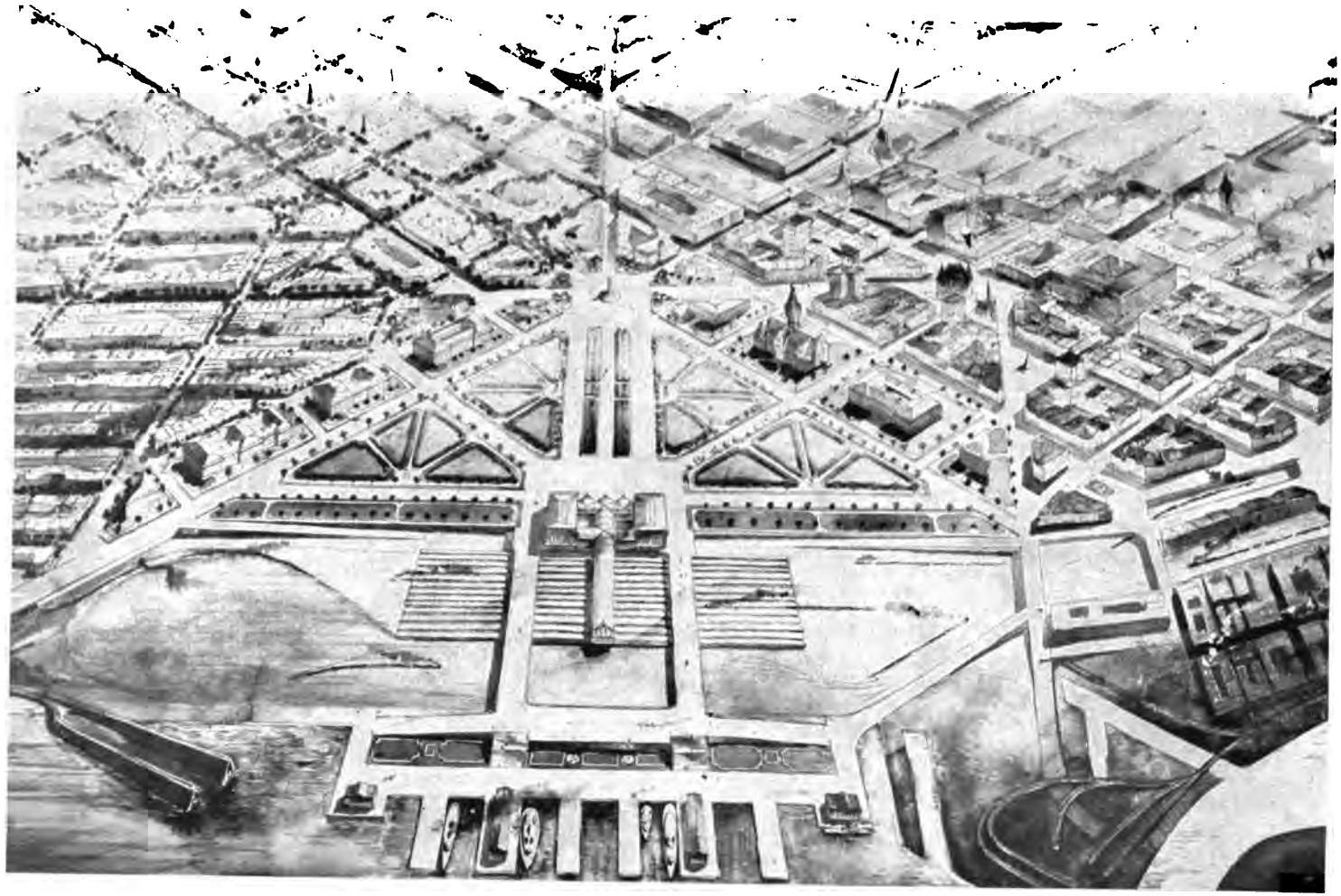
By Mr. Albert Kelsey.

I know that every one in the audience, with the exception of the last speaker, will thank me for completing his address, for many of you could not possible have gathered from what Mr. Cary so modestly said that he was the author and sole author of that magnificent plan for the development of Buffalo, which is destined to do much to physically redeem his city. [Applause.]

Possibly you will also pardon me if I digress just a moment from my own subject, which has to do with traffic in the streets, rather than on regular railroads, to comment on one or two of the addresses that have been made this morning; in fact, I shall hold myself down to just one subject. The speaker preceding Mr. Cary referred to the conditions in Hartford, I believe, by saying that it was found necessary to run some of the trains around, because there was not sufficient clearance under certain bridges, and then he showed us views of this new concrete work, and it seemed to me such a very inadequate and timid attempt to meet conditions that I could not help comparing those low concrete arches with the wonderful achievement that is now being carried out along and under the Rue de Rome to facilitate two-storied railway trains in their coming and going into Paris. The point I want to make, and I will not



GROUP PLAN I. BUFFALO.



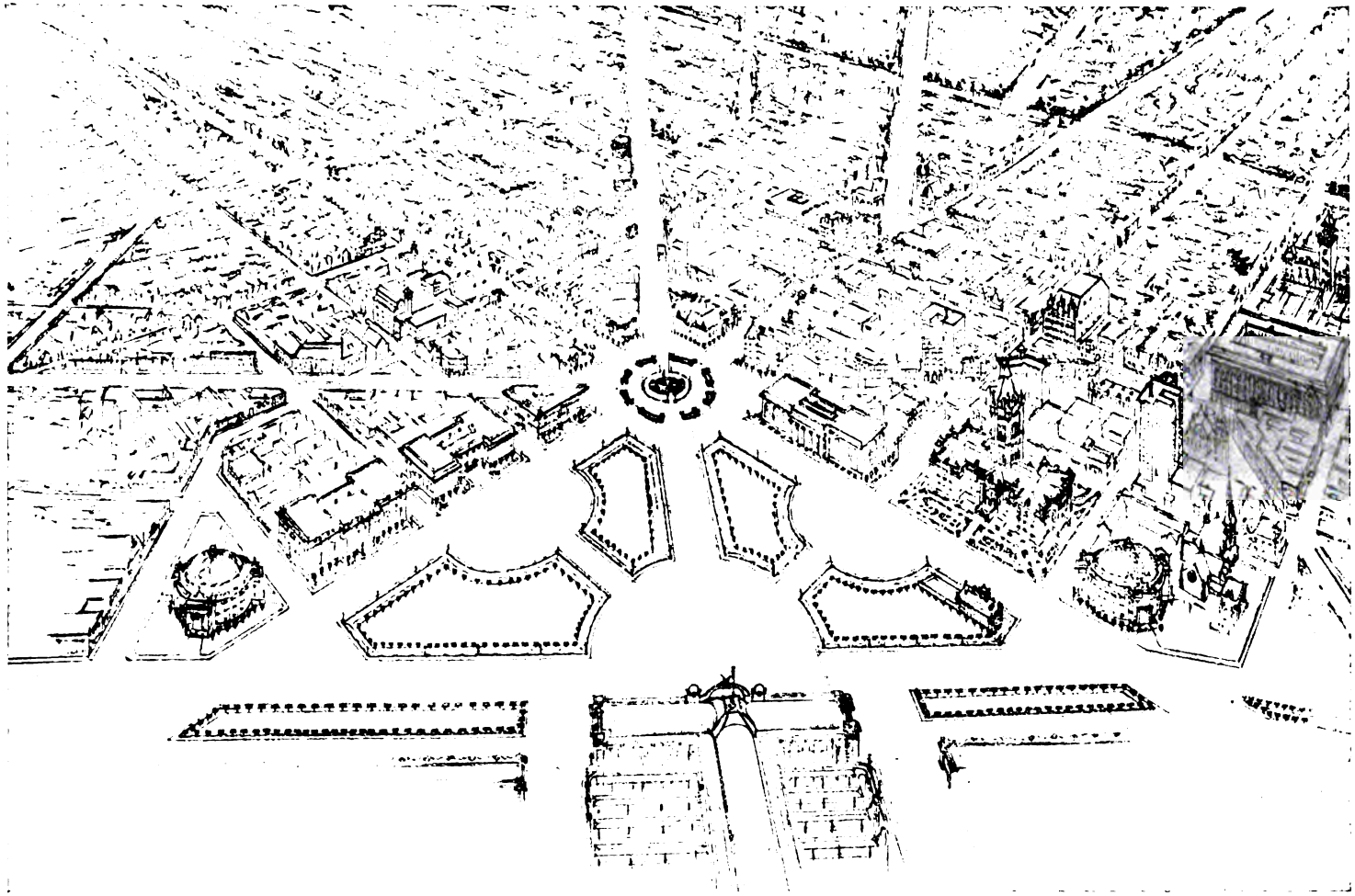
BUFFALO. BIRD'S-EYE VIEW OF PLAN I.

go farther with the comparison, is that we not only have to meet in these traffic problems the necessity of jamming freight and other transportation through our cities, but we also have to consider, or should consider, the rights of the citizens, as there are many cities that have been walled off by railways and as these railways have widened their viaducts, the viaducts always being very low, the resulting separation of a town from itself has become a great menace to certain quarters of our cities. It is so in Philadelphia, where the widening of the Pennsylvania Railroad converts streets into regular culverts, so much so indeed that it is actually difficult sometimes to drive a load of hay through some of our principal streets. Therefore, because of lack of clearance, it seems to me that, as abroad, this matter should be considered from the standpoint of hygiene, circulation of air, and the general well-being of the public, and then let the railroads have a say. Of course the railways have their own troubles, and it is a hopeful sign that in their efforts to solve them they are beginning to take a less selfish point of view and are even now and then willing to listen to architectural advice and to suggestions on city planning which they are beginning to learn is to their own business interest—as city and railway must prosper together and spread and grow on the same plan to produce the best results for both.

We are all delighted with what we have heard to-day, and rejoice in feeling that we are getting more and more into sympathy with the railroad authorities; that we are coming more and more together, and that we are going to have well-ordered cities before long. Surely the openness, the salubrity of our streets, the arterial system considered from every point of view, not only from the railroads' point of view, but also from the point of view of sunlight and air, demands that traffic must be considered altogether in all its branches as one and inseparable. You have an illustration of greed which is very concrete in these illustrations. Not only has the Pennsylvania Railroad bridged the city at a very low level, but through a piece of wonderful business sagacity has built an entire station over a street, building tier upon tier of private offices to obstruct the circulation of air on 15th Street. Now, that is all wrong, and fortunately the Pennsylvania Railroad realizes it, and has changed its ways, for it is through its splendid enterprise and initiative that the magnificent new station, with its big court, is being carried

out here in Washington, and equally enlightened methods are now being adopted elsewhere.

Now coming back to my own subject, that of traffic in the streets. It is curious how the roadway is seldom respected. Here you have an illustration which is most amusing. It is right at the intersection of two of the most conspicuous streets in the city of Columbus, right in front of that noble old capitol building. There amid trolley poles and other litter you will notice they have attempted to glorify a man in the gutter. [Laughter.] No one thinks that at all strange, and any kind of an encroachment seems to be permissible, if you have sufficient "pull." Now, when they installed the trolley lines in some of the outskirts of Paris, they treated the poles in different ways, in accordance with the finish and character of the neighborhood. You will notice here [indicating] one of the poles undressed, and the other dressed. And in Brussels that thought is particularly noticeable. There is a certain sense of fitness in the installation of the equipment of the trolley road which is absolutely unknown in this country. These diagrams you have seen before. They represent, perhaps, the most enlightened scheme of distributing traffic and making the different quarters of a city easily accessible. Briefly, both schemes illustrate comprehensive distribution and avoidance of intersecting traffic routes, the idea being instead of having to go, as we do in Philadelphia, here [indicating] and here, that you can come here, along this perimeter of distribution [indicating] and go to there, or to there, and all these different points become distributing points or trolley stations or transfer points, or whatever the system may be, and in that way congestion is minimized. I will not be as modest as Mr. Cary, because I wish to show you by a personal experience how hopeful conditions are in the United States, and how quickly our people, once they give their attention to a matter, respond to actual need. Only four or five years ago I stated that a rearrangement was necessary in Market Square at Harrisburg, in order to simplify the traffic and place there the units that were being contemplated. The first was a monument to John Harris, which will be erected at the intersection of the two principal streets, which cross in the middle of Market Square. The idea was then to retain the trolley track intersection there. The one or two public-spirited men with whom I came in contact said, "You



BUFFALO. BIRD'S-EYE VIEW OF PLAN II. LOOKING EAST.

cannot move the tracks now; nobody will countenance it at all." Within the last two weeks this matter has come to a head, and undoubtedly the tracks will go. The combination of utilities arranged for at this point is interesting. The trolley tracks come in from distant towns and formerly intersected at the center of Market Square as they do in many other cities, especially in the middle west. Take, for instance, the city of Columbus, where there are any number of very large cars coming in from a radius extending out fifty miles, and even sleeping cars to Dayton; and these sleeping cars frequently wait in a public street and use that public area as a station, and in order that there shall be no uncertainty as to where the station is, the trolley company goes to the enormous expense of expending money for an electric sign across the street, which reads "Trolley Station," or "Terminal Station," though there is not any other evidence of the station excepting the waiting cars blocking the street. How different this service is from the way cars are provided with a convenient place to wait outside the Opera House at Rio de Janeiro. There they park without interfering with either trolley or other street traffic and patiently wait; their carpeted floors and cushioned seats, covered with white muslin, too, show a painstaking care to serve the public that we in the north know nothing of.

Now in this case the proposition is one to accommodate the waiting public in a convenient way at a point where they can wait and watch for their cars, but instead of the trolley company having a private waiting room in a house just outside of this line here [indicating] it has been arranged that the city will build, possibly jointly with the trolley company, or certainly will control the erection of, two semicircular low waiting rooms, which are to be entirely of metal and glass, so that the people in them can watch for the arriving cars. Furthermore, the intersection of traffic is entirely broken up, and there is a safe place for people to wait outside now without having to stand in the roadway. Frequently in Harrisburg you will find barrels and baskets and crowds of people waiting out in the middle of the street for their cars. With this isolated center they will be perfectly safe, and in a much more advantageous position than they have to take at present. Here [indicating] you have the scheme on a larger scale, gentlemen, and the idea is to

have, inside and partly screened by the circular waiting room, steps which will lead down to the underground toilet rooms, which will extend from one waiting room to the other, right across, so that the department for women and the department for men will be entirely distinct and each can be approached from either one of the waiting rooms. My plea is simply that the same vigilance is necessary to-day on the part of public-spirited citizens in watching the encroachments and abuse of privileges which are seized upon by the trolley people, as formerly was necessary in safeguarding the public from some of the most rapacious railway companies.

I repeat what I started with, that the outlook is very hopeful, but, at the same time, and especially in the middle west, the encroachments and abuses of privileges, on the part of trolley companies, are becoming a very great menace to the safety of our streets and to the general convenience of other kinds of circulation.

I thank you very much for your attention. [Applause.]

Mr. Elzner: I again have the pleasure and the privilege of moving a vote of thanks to Mr. Kelsey for his admirable paper, and I am sure for my part I do, and perhaps the Institute might, extend its best wishes for the success of these and other enterprises which are inaugurated by our members. [Applause.]

The motion extending thanks to Mr. Kelsey was seconded, and upon being put was unanimously carried.

The President: Mr. Kelsey, I have the honor to thank you in behalf of the Convention.

The President: You have heard from Mr. Rockart how the railroads have cut up New Haven, and you have heard how Mr. Cary has railroaded the station down to the Waterfront, with the probable intention of dumping it into the Lake, but I was more surprised than I can tell you to hear a Philadelphia man say, at least inferentially, one thing that amazes me, though I have often heard New York people say that grass grew in the streets of Philadelphia, I never knew that they harvested a crop of hay there, and I am especially surprised that Mr. Kelsey should admit that they have no proper facilities for carrying hay through the streets. [Laughter and applause.]

DINNER.

DECEMBER 16, 8 P. M.

President Gilbert: Ladies and gentlemen, I have the honor to ask you to rise and drink to the toast, "The President." [Applause.]

Toast.

President Gilbert: Ladies and Gentlemen, I have the honor to ask you to rise and drink a toast to the "United States Senate and to the House of Representatives—may our relations always be good!" [Applause; a voice: "Hear, hear!"]

Toast.

President Gilbert: I am requested at this auspicious moment to propose a toast in which the gentlemen, I am sure, will all most heartily join—"The Ladies." [Cheers.]

Toast.

President Gilbert: I have the honor to introduce Mr. Finley, President of the Southern Railway. [Applause.]

ADDRESS OF W. W. FINLEY, PRESIDENT, SOUTHERN RAILWAY COMPANY, AT A BANQUET OF THE AMERICAN INSTITUTE OF ARCHITECTS, WASHINGTON, D. C., DECEMBER 16, 1909.

MR. TOASTMASTER AND GENTLEMEN: Managing a railway is in many respects like managing a household. The principal difference is that the operations of the railway manager are on a larger scale than those of a housekeeper. In both cases there is the identical necessity, in proper housekeeping, of keeping the scale of expenditures down to the available resources.

Relatively speaking, there are few households in which everything that may be desirable can he had without a thought of the cost, and in most households the desirable things must be balanced against each other and those chosen which are more necessary or which will contribute in a greater degree to the comfort or pleasure of the family. So there are no railways on which expenditures must not carefully be scrutinized, and there are few on which it is not necessary to balance desirable projects against each other, taking into consideration the resources that are available

and determining which are the most essential to the welfare of the property and to the improvement of the service as a whole.

Just as the housekeeper must give attention primarily to the three essentials of living quarters, food, and clothing, so the railway manager must give his first attention to the three essential elements of a railway—its tracks, its cars, and its motive power. There are, however, many accessories which the railway housekeeper must provide and which are almost as necessary as these three essential elements. Among the most important of these are the many varieties of buildings required by a railway, from the mere wooden box that shelters the flagman at a street crossing to the general office building and the great city passenger station. A large proportion of the buildings required by a railway are uniform in type and relatively simple in construction, and can be designed by your professional cousin, the civil engineer. As a rule, it is only when a general office building or a large passenger station is to be erected that the services of men of your profession are required, and by far the greater part of your work for the railways is in connection with the erection of passenger stations. I shall, therefore, Mr. Toastmaster, confine my brief remarks this evening principally to the discussion of some of the more important questions of policy involved in the provision of passenger stations.

All of you who have had any experience in the designing of railway passenger stations have probably found that your relations to your client are somewhat different from the relations that ordinarily exist between the architect and his client. When you are called upon to design an office building, or a residence, the wishes of your client are your sole guide in determining all questions of design and cost. When, however, you undertake to design a railway passenger station you soon realize that, on account of the relations of the functions of a railway to the public, you have to consider not only the wishes of your client but also the public opinion and convenience of the community in which the station is to be erected. Your private client might determine to put up an unattractive building in a neighborhood generally occupied by expensive and beautiful improvements. The owners of the surrounding land might not like it, but if they undertook to interfere they would promptly be told, more or less politely, to mind their own business. It is not so with a railway company. Public opinion generally insists, and insists strongly, that a railway passenger station shall not only be up to the general level of private and municipal architecture in the community, but that it shall be above that level and shall set a higher mark for the future.

It is quite natural that the civic pride and artistic taste of a community should find gratification in handsome structures of this character. It is proper to inquire, however, how far the wishes of the community should be controlling upon the railway company and its architect. I believe, Mr. Toastmaster, that a careful examination of this question will lead us to the conclusion that, in this respect, as in all others where the interests of the railway and of the public touch each other, they coincide and are identical, and the problem is, therefore, one to be worked out, keeping in view the fair interests, both of the community and of the railway.

Let us now consider the passenger station in its purely utilitarian aspect, as a necessary facility for the transportation of passengers. The first thing to be considered is its location, which, generally speaking, should be as convenient to the hotel and residence centers of the community as the location of the railway lines will permit. The location of the railway must be the controlling factor, as was very aptly expressed by an old negro who was driving a commercial traveler from a Texas railway station to a hotel a mile away.

"Why did they put the station so far from the hotel?" asked the traveler.

"Well, boss," replied the driver, "I's forced to admit dat I hasn't give the matter s'ficient cogitation, but I s'pose dey done dat so as to have de station somewheres nigh de railroad." [Laughter.]

It being necessary to have the station "somewheres nigh de railroad," and as convenient for travelers as possible, other factors in determining its exact location will be the tracts of land that are available, the practicability of convenient and safe access, and the ever-present question of the relative cost of buying and building on the available sites.

The matter of size is often one of the most difficult with which the railway company and its architect have to deal and one on which they frequently come in touch with public opinion. The controlling consideration should be the number of passengers who may be expected to use the facilities of the station at one time. In determining this many factors have to be taken into consideration, including, not only the present population of the city, but its probable future growth, and—in the case of a station at a junction point—both the present volume of interchange traffic through the station and its probable future increase. Consideration will also have to be given to the character of traffic. If it is such as to tend to congest the station at certain hours the building must necessarily be larger than if the same aggregate number of passengers should be more evenly distributed throughout the day.

It having been determined that the station must be large enough to accommodate the present travel with a reasonable allowance for future growth, we come to a consideration of the general plan of the building and its interior arrangement. It is here that the architect has the principal opportunity to display his skill. There may be limitations imposed upon him by the shape of the site or by the location of the approaches to it, but, within these limitations, he should subordinate everything else to designing a building that will contribute in the highest degree to the convenience and comfort of the traveling public and to the convenient and expeditious dispatch of the business of the company. Here, again, not only the volume but the character of the traffic should be taken into consideration. If it is a station used largely by passengers waiting for connecting trains, or by through passengers generally, the waiting room accommodations will have to be relatively greater than in a station used largely for suburban traffic. Suburban travelers, with monthly or other forms of commutation tickets, have no occasion to stop in the station any length of time. Many of them time themselves so as to get there just

before the train starts, and what they want is a clear, unobstructed passage from the entrance to the station to the train platform. In designing stations of all kinds, and especially in large stations, this matter of facility of movement to and from trains should always be kept in view. In this connection, both the architect and the railway officials should bear in mind that a considerable proportion of the people who will use the station will be strangers, unacquainted with its arrangement, and ample provision should be made for bulletin boards, for conspicuous signs over ticket windows, baggage rooms, etc., and for such other inscriptions as will aid travelers in finding their way. The capacity of baggage rooms, parcel rooms, lunch rooms, and restaurants should all be governed by the expected volume and character of travel.

A detail to which too much attention cannot be given is that of lighting, and the architect who so designs a station as to obviate the necessity for artificial light in any part of it in daytime merits the thanks both of the railway management and of the traveling public. Arrangements for night lighting should be such as to provide the maximum of light in the places where it is most needed without undue expense.

When the architect and the railway company have advanced to this stage and have provided for a station of adequate size, with the best possible arrangement they can devise, they may then turn their attention to architectural effect. It is desirable that, as a whole and in detail, the appearance of the station should be as agreeable as it can be made without incurring unreasonable expense. I have no hesitation in saying, however, that artistic effect should be subordinated absolutely to utility. It is possible that a very plain station might be an unusually convenient and comfortable one, and an elaborately decorated station might be highly inconvenient and uncomfortable. But, fortunately, the men of your profession excel in combining the useful and the beautiful, and there is no reason why a convenient and comfortable station should not be attractive in appearance.

Though I speak entirely as a layman, not even being one of your cousins of the civil engineering family, I shall presume to offer some suggestions as to how architectural effect should be sought in passenger station design. First, I would suggest that the architect should remember that locomotive smoke and dust are inevitable in the neighborhood of a passenger station, and that it will be used by all sorts and conditions of men, women and cdildren. Both in the selection of building materials, therefore, and in design and decoration it should be the aim to produce a building the appearance of which will not be spoiled by smoke and which can easily be kept clean. By reason of its surroundings and use a passenger station is, at the best, difficult to keep free from dirt, and the management is, therefore, justified in seeking the co-operation of the architect in designing a station that will be most easily kept clean. .The matter of cleanliness of passenger stations is one that should be absolutely insisted upon by the railway manager who values the good opinion of travelers using his lines, for I believe that, in many cases, criticism of railways and an unfavorable public attitude toward them may be traced to the condition of passenger sta-

tions. As far as possible, we should avoid carvings, mouldings, ledges, and all other forms that tend to catch and retain dust and dirt. Unnecessary projections above the roof line should also be avoided.

I believe that an impression of the fitness of a building for the use to which it is to be put is one of the most important factors in attaining architectural effect. The treatment of the exterior of a passenger station should be such as to produce a distinctive building, so that the stranger approaching it need not be told that it is a railway station. An intelligent observer, commenting on a building in Washington designed for governmental purposes, remarked that it was a cross between a cathedral and a cotton mill. Another illustration of the failure to produce a distinctive and appropriate design was afforded on one occasion when the Southern Railway Company asked for designs for a station building. In several of the plans submitted the exteriors would have been admirable for seashore hotels, but were altogether unsuited for a passenger station. I believe that in passenger station designing this distinctive character can best be attained by the artistic and symmetrical arrangement of lines and masses, so far as this can be done without sacrificing utility rather than by any kind of purely decorative work. I was much impressed some years ago by a statement which was attributed to a French architect that, on account of the close association in the popular mind between time and a railway train, a station should always have a big clock on its front wall or in a tower. I do not go so far as to agree that a clock should be placed on every station, but I think the suggestion is one that might often be adopted.

A fact that both the railway manager and the architect should keep constantly in mind is that a station that may be admirably suited for one locality may be unsuitable for another locality. In our southern territory, for instance, there is not the same necessity for considering protection from the cold as in more northern localities. While provision should be made for properly heated waiting rooms for use on the comparatively few days when the weather is unusually cold and for the use of tired travelers at all seasons, I believe that the concourse between the station proper and the tracks should be one of the principal features of a southern station. It should be so constructed as to afford ample room for passengers to stand or walk about in the fresh air. This concourse, if properly treated, can be made one of the most attractive features of stations in the south, and it is one to which I think the members of your profession should give careful consideration in designing stations for railways in that section.

Having discussed the passenger station both in its utilitarian and architectural aspects, we must now consider it from the viewpoint of railway housekeeping. Let us assume that a certain city is provided with station facilities that are not quite up to the standard of similar facilities in some other places of approximately the same population and commercial importance. They are not such as the community would like to have, and they are not such as the railway management would consider ideal. The community believes it is entitled to the best of everything. It does not want a station that will be merely as good as one in a nearby town of the same size.

It wants a better one. It would like to have the best and most beautiful station of any town of the same relative importance in that whole section of the country, and it does not hesitate to say so through its municipal officers, its commercial organizations, and its newspapers.

The railway manager is in much the same position as the housekeeper when the old piano, which is still fairly good as a musical instrument, has had its case battered and scratched and the daughter of the family demands a new one. If he could draw on unlimited supplies of money he would like to provide every city on his line with an architectural monument, and every little way station with an artistic gem. It would be a splendid advertisement of his road, and the American Institute of Architects would hail him as the greatest railway manager the world had ever seen. [Applause.] But, just as the housekeeper who would like to buy the new piano must think first of the monthly grocery bill, of the needs of the family for clothes, of the leak in the roof, and, possibly, of the necessity for an addition to the house, so the railway manager, whose resources are always strictly limited by the earnings of the road and its credit, must think of his operating expenses, fixed charges, and taxes, and of the need of additional tracks, more cars, and additional and more powerful locomotives. He is glad to contribute to the gratification of the artistic taste of the public, but his first duty is to haul the public and its property over his lines, and his first care must be, so far as the resources at his command will permit, to provide adequate facilities for performing this service. In the long run it is to the interest of the communities along his lines that he should do so. In the case of the typical community we are considering, its people have a vital interest in having their traffic handled promptly and satisfactorily, and it may well be that the money which the new station would cost, if expended for additional tracks in their own neighborhood, or possibly, at some choke point on the line many miles away, would be far more beneficial to their city as a whole than would be the most splendid passenger station to which they could aspire. In that case their interests and those of the railway are identical, and it is better for all concerned that they should put up with the not entirely satisfactory station facilities for a few years longer rather than that the more vital improvements should be delayed.

I am talking to you frankly on this subject, Mr. Toastmaster and gentlemen, because I believe it is not generally understood to what an extent the resources of the railways of the United States would be burdened if they should undertake to meet the wishes of all the towns along their lines in this one matter of passenger stations. This is a matter that should be considered in connection with the fact that there have been substantial reductions in passenger fares by public authority in many parts of the United States in recent years.

It should be borne in mind that capital invested in passenger stations in excess of the amount necessary to provide adequate and proper facilities for doing passenger business is unproductive. It brings in no return and the interest on it is a constant loss. The point I am making may be illustrated by citing the Union Station in this city. I must not be understood as referring to that structure of splendid propor-

tions and beautiful design, in which the artistic and utilitarian have been combined in an unusual degree, in a spirit of criticism of the conditions that required its construction on such an expensive scale. Conditions here are radically different from those in any other city in the United States. It is probably not unreasonable that a station in the national capital should bear some relation to the public buildings of the Government, that the building and its appurtenant trackage should be sufficient to handle the inauguration throngs, and that special accommodations should be provided for a single occasional traveler—the President of the United States. The fact remains, however, that the passenger terminal facilities of Washington are such that they are only fully used for a few days every four years, and that the cost of their operation and maintenance, including the fixed charges on the capital investment, are a heavy burden on the railways using it, and all without bringing them an additional dollar of revenue by reason of its use. I think it is right that the public should understand that this cost is so great as to absorb the total gross revenue derived from passengers to and from the nearest stations, and to absorb all the profits on passenger business to a considerable distance out of the city. On account of the peculiar conditions existing in Washington, this situation is not to be criticised, but it must be apparent that the Washington station cannot properly be taken as a standard for other communities.

I believe, Mr. Toastmaster, that the members of your Association, or such of them as have railways for their clients, can contribute more than any other set of men to solving the passenger station problem to the satisfaction both of the railways and of the public. Its solution is to be found, in my opinion, in an education of the public as to the relative importance to them of railway expenditures which provide facilities for moving traffic and those which do not, and by the evolution of a type of passenger station which will afford the best possible facilities and which will be artistic, without involving expenditures for elaborate ornamentation and decoration. I am confident that there are many members of this Association who are capable of evolving such designs. When you have done so your commissions on a single station may not be so large as upon those monumental structures you are now occasionally called upon to design, but I believe that what is lost to you in that way will be more than made up to you in the increased number of such commissions. [Prolonged applause.]

President Gilbert: Ladies and gentlemen, I am tempted to break the invariable rule which I have established for myself in the brief period of my presidency over the Institute—a rule which I have followed without exception—that in acting as the presiding officer on any occasion where we have guests as speakers, to let the speakers do the speaking. I am tempted, however, to break the rule in this case, but I will resist the temptation. You will, nevertheless, understand that if I

could comment upon Mr. Finley's very able speech in the terms of praise which it so highly deserves, I should be delighted to do so.

I have the honor now of introducing a man who needs no introduction, one who has been given a title rather above that of the average mortal, a title in a semi-humorous vein which, I understand, was conferred by one of his Congressional friends upon Senator Newlands in advance of his demise, "The Patron Saint of the American Institute of Architects." [Applause.] It is a serious thing to be sainted before you die. You have to live up to it.

Three cheers were proposed and given for Senator Newlands.

ADDRESS.

By Senator Francis G. Newlands.

Mr. President, ladies and gentlemen, I thank you for this very cordial greeting and your President for his very kind words.

I look with great satisfaction upon the fact that at your banquets, which are usually given up to good fellowship and merriment, you have undertaken an educational propaganda, and that you have tried your hand first upon those great organizations with which the legislative bodies have recently had so trying an experience [Laughter]; and I am glad to know that these great railroad organizations have responded to your appeal and that through their high officials they are here to consider with you the relation of art to the railroad and the relation of the railroads to civic planning. It is gratifying to realize that they are recovering from the stupor occasioned by legislative hammering [Laughter]; and it is gratifying to know that legislative violence is being moderated, that the turbulence of the public is being somewhat restrained and it is more gratifying to know that the railroads are coming to a realizing sense of popular rights. [Applause.] I look to an era in the near future of perfect understanding between these great railroad organizations on the one hand and the people on the other, the people recognizing the railroads' rights and the railroads recognizing the people's rights [Applause]; and both pursuing higher standards of action with reference to each other. [Applause.] Mr. Finley has referred to the railroad engineers as being conspicuous in railroad construction. No

one would underestimate their importance in constructive work, but I hope within the near future the railroads, as some of them have already done, will realize the value of adding to the work of the engineer the work of the architect, the landscape architect and the artist. [Applause.] I hope that the time will come when the railroads of the country will have a council of arts, composed of the engineers and the landscape architect and the architects. It will be somewhat ill-balanced, it is true, a majority being given to art [Laughter] but with my predilection in favor of art and the artist I do not believe that it will prove to be an ill-balanced tribunal. [Applause.]

In civic planning we are only beginning to realize the importance of the transportation center, as matter of convenience and as matter of appearance. We all realize that as a rule in almost every town the transportation center is the most unsightly portion of the town. As a rule the railroad structures themselves are not attractive; railroad constructors have had the idea that art was expensive. I wish to say to Mr. Finley, and it is doubtless his own judgment, that, having had a large experience in construction of various forms, I have always found that the most economical thing in construction was to employ an expert, and the expert must be an architect. [Applause.] Then it seems to me that attention should be paid by the railroads themselves to the surroundings of the passenger station, particularly. If in opening up the new towns of the south and of the west, or in the work of enlarging the old towns they would plan comprehensively, not only to the railroad stations themselves, but with reference to their immediate surroundings, they would add greatly to the value of their work, for the railroad station and the region immediately around the station is a portion of every town or city which comes under the observation of the passers-by, and an attractive railroad station, with attractive surroundings, is a constant advertisement of the town itself.

We are engaged in this country and have been since the great White City was built by your aid in Chicago, in bringing about a renaissance of American art, and we need the cooperative aid of everybody. The municipalities are being aroused to the importance of civic planning, planning their water fronts, planning the civic centers, planning their parks, their parkways, their commercial avenues, and their play-

grounds; and if the great corporations will co-operate with them in the work of making all this construction beautiful, they will greatly advance this renaissance. They have the advantage of perfect organization, the advantage of enormous capital, they have the advantage of concentrated purpose and they can bring an influence to bear upon civic improvement itself beyond that of any other single influence. We are just entering upon a great period of constructive work. Hitherto the nation has done little in a constructive way; its work has been mainly destructive and its constructive work as a rule has been inefficiently done. The spoils system which prevailed so long in political appointments has also prevailed. Governmental projects and projects involving public buildings in our towns and cities and involving large expenditures in river and harbor improvements have been guided not so much by the genius of skilled men, engineers, architects, great constructors and artists, but have been determined by the greed or the energy or the persistence of a single senator, a single representative desirous of bringing back to his particular community as much of the public spoils as it was possible for him to carry. We have gotten rid of the spoils system, so far as appointments are concerned. Civil service reform has almost accomplished that work for us, and the work now devolves upon us of absolutely destroying the spoils system in connection with public works [Applause], and so far as I am concerned I would gladly see every public work not at present absolutely essential halted in its operation until the nation could agree upon a comprehensive plan for such improvements, designed by men capable of designing. [Several voices: "Hear, hear!" and general applause.] You all know the sporadic, accidental method under which public buildings have been constructed. Methods have been improved, it is true, but they are yet far from perfect. You all know how the Rivers and Harbors improvements have been made, under methods which have been improved, it is true, but still are far from perfect. The country is demanding good public buildings; the country is demanding the improvement of our rivers and harbors. It is altogether probable that in the next few years we shall witness the development for a plan for expending at least fifty millions of dollars annually in our rivers and harbors, and a sum approximating that amount upon our public

buildings. Now in the formation of the comprehensive plans, what is it necessary for us to do? It is clear that we should have, as the Rivers and Harbors Congress has recently indicated, a great department of works, which would bring into co-ordination the various scattered services of the Government that relate in any way to use of water. The Reclamation Service, the Forestry Service, the Drainage of Swamp Land, the Development of Water Power, the Promotion of Navigation and all of the services that relate to the various uses of water, so that these various services, instead of acting as they do now disconnectedly and often times in antagonism to each other, should be brought through a common board in which their chiefs can meet and consider plans in absolute harmony. In that Department of Works, the Bureau of Arts, upon which you have your hearts set, would have its place—a Bureau of Arts, with a council of arts [Applause], composed of the leading members of the various artistic professions, divided into sections, each called in when great plans are being considered, to give its judgment upon the subject within its jurisdiction. And thus we would have the scientific services of the government brought under one department—into co-ordination with the great artistic professions of the country.

Then we require the co-operation of the nation with the States, for we have in this country a dual sovereignty—the nation, supreme within its jurisdiction over every inch of American soil, the States within their jurisdiction supreme over every inch of soil within their boundaries; and under this dual system of government in engaging in great constructive work, such as the improvement and development of our rivers, where the United States has jurisdiction only with reference to navigation and the States have jurisdiction relating to almost everything else, it is essential that these two great sovereignties should be brought into a harmony of action, for the development of our rivers from their sources to their mouths, for every use to which civilization can put them—irrigation of arid lands above, the drainage of swamp land below, the intermediate development of water power, the clarification of the streams, the protection of the banks against erosion, the cutting of a channel for purposes of navigation—and it is therefore essential that the States should have agencies resembling those of the National Department of Works, through which the States can come into connec-

tion with the national sovereignty through its Department of Works: and thus we can have co-operation in the place of antagonism, and harmony will take the place of the wordy war which has existed for generations as to the limitation between national rights and powers and State rights and powers. The municipalities must also be considered. They are already coming more closely in touch with the artistic bodies of the country than either the States or the nation, for municipal improvement in the line of art is coming on at a more rapid pace than State or national development, and if these municipalities will create similar bodies there is no reason why they should not be brought into co-ordination and co-operation with the great department to which I have referred. Thus in construction and in art we will have great legislative bodies, if you please, resembling the Congress of the United States, sitting in judgment upon questions relating to construction and art, and when we get the constructive works of the Government, the State and the municipalities thus organized, we can then frame the comprehensive plans in which each, within its jurisdiction, can do its work, a work so designed that it will dovetail with the work of the other.

Now this looks like an ambitious programme, but it is essential; it is near realization; it has already been developed by the propaganda that relates to the conservation of our natural resources. The nation is taking an inventory of its capital stock, its stock in coal, its stock in oil, its stock in public lands, its stock in forests, its stock in waters—and the people of the country, far ahead of the legislative branch of the country, as they always are, for the people make public opinion and Congress simply follows it—are intent upon the conservation of the natural resources and of entering upon the great business of construction and development in a business-like way. [Applause.]

I am told that you are going to have your next Convention in San Francisco. I am glad to hear it. It is a beautiful city, of incomparable location, on a peninsula composed mainly of hills, from which you can view the Pacific Ocean upon the one side and the Bay of San Francisco upon the other. Nature did more for that location than it did for any city in the world, and man did more there than in almost any place that I know of to mar the work of nature. [Laughter.] Fire destroyed almost the entire city and the work of restoration was before its courage-

ous people. Did you ever think how inadequate the organization of society is to meet a great catastrophe of that character? There they were, possessing all the elements of a great city, except houses—the incomparable location was there, the beautiful bay, the enduring mountains, the population was there, the commerce was there, the means of transportation having been unaffected, and all that was lacking was habitations for the people. Had society been organized throughout the civilized world as it should be to meet such an emergency money could have been brought there quickly, not simply to feed people and to breed in them habits of dependence, but to set them at work in building their own habitations, temporary habitations, before entering upon the work of complete construction. But that was not available. Assistance is only available to feed. The aid given by the insurance companies was tardily given; they responded nobly, but it took time, and the problems before that people seemed almost insurmountable. But, suppose at that time they had had a commission consisting of engineers, architects and artists and great constructors, such as built the great White City at Chicago. You could imagine how they would have reformed the unsightly plan of the city, how they would have planned for a beautiful water front, for diagonal avenues for commerce, for parkways and parks, and how by bringing into harmonious relations with them the great engineering, architectural and artistic organizations of the city and the country they could have led a willing people into a harmonious development of a great city, which it was theirs to build anew. But no such organization existed. Harmony has not been one of the prevailing elements of San Francisco organizations. It is the greatest city for individual work, I believe, in the world. Each individual will pull more weight there than in any community that I know of, but there was no co-operation of effort, and there was no means of organization through which co-operation could be secure, and so while in each individual case the work was in the main well done, strongly done, beautifully done, yet you could imagine how that work could have been improved upon, had harmony of design, harmony of effort been secured in replanning that city, and if the same strength had been given to co-operation that was given to individual effort. I am glad that you are going there; I hope that you will teach them

the lesson of your art, the advantage of uniting art with utility, in order to advance the comfort, the beauty and convenience of life, and that in the near future they will organize the plans that will make it, in its water front, in its beautiful hills, and in its parks and parkways, a model city of the world. [Applause.]

President Gilbert: Ladies and gentlemen, I have the honor to introduce Mr. Frederick A. Delano, President of the Wabash Railroad. [Applause.]

ADDRESS.

BY MR. FREDERIC A. DELANO, PRESIDENT WABASH RAILROAD.

I took up more than half an hour of the Convention this morning with a paper, which I had prepared at the request of the Institute, on the subject of the "Relation of Railway Terminals to City Planning," and until I came here I supposed that my full duty in respect to speaking had been done. I naturally don't want to touch on that subject very fully, and yet some of the remarks which Senator Newlands has made inspire me to say something of the relations, in a general way, of railroad corporations to these problems. It is very appropriate that in this city of Washington of all cities this question of the relation of railway terminals to city planning should be discussed, for, if I am correctly informed, this is the very first city in the world, certainly in this country, where the location of the railway station was changed to conform with the city plan, and even here it was only possible because the Pennsylvania Railroad corporation, through its President, Mr. Cassatt, was big enough and generous enough to see that it ought to give away and yield a site which it had superior in its location, in its nearness, to any other site. I cannot help speaking of that, because I think Mr. Cassatt showed his bigness in that as much as any act of his life. [Applause.]

I want to say a word about the relations of railways and railway men to these public questions. Railways are not very old, only some eighty years old, and most of them have been built in the last half of that period. I entered the railroad service twenty-five years ago. At that time the railway men of importance—the men who had been pioneers twenty-five or thirty years before that—were feeling very

bitter at the attitude of the courts and the legislatures in relation to railroads. The courts had laid down the doctrine that railroads were "quasi public" institutions, and that for that reason were subject to public regulation. Now, the railway men of to-day are not, I think, any better than the railway men of that time, but they have been educated in a little different school; they have accepted that doctrine of the quasi public institution; they see that if the railroads are quasi public institutions, then the railroad official is a quasi public official and that he must consider public questions and enter into them as a public official should.

When our country was founded the great word of the day was "Independence." In recent years another word has come into use, very like that, but a little different, "Interdependence." We have learned to understand what that word means. We want our State rights; we want our cities to have their individuality; our individuals and our corporations want their freedom of action—and yet we begin to understand that there is an interdependence of one with the other which cannot be ignored. The business of the country cannot prosper as a whole when the railroads are suffering, and the reverse is true. A city cannot have a natural and healthy growth if the railroad is interfering with it. And so with this word "Interdependence" there are also the words "Co-operation" and Co-ordination," the meanings of which I tried to express in my remarks of this morning. I wrote that paper with a good deal of hesitation, and when I got through I felt that I knew very little about the subject. I felt that my excuse was that there necessarily could not be so very much known on that subject; but I hope that this Institute of Architects, which has taken up the subject vigorously, will follow it up at future sessions and that some of the underlying principles which govern the matter of proper placing of terminals in great cities, and the relation of those terminals, both freight and passenger, to the city will have the earnest consideration of the best minds among you.

I thank you very much. [Applause.]

President Gilbert: Ladies and gentlemen, I have the honor to introduce Mr. W. H. Boardman, of New York. [Applause.]

RAILWAYS AS CITIZENS.

By Mr. W. H. Boardman, Editor of the "Railway Age."

Ladies in the Balcony and Gentlemen: I know many railway officers who, at the time of the last election for President of the United States, felt somewhat like the log driver with three red-haired daughters. The oldest one had been long, overlong, in the matrimonial market, and she was detaining the others. He was anxious; his wife was anxious. When she telegraphed him that the oldest girl was engaged, he answered: "Thank God the jam is broke." Looking backward there are reasons for thinking the railway men were right, that some of the logs in the jam are loosened, and that the railways have in part accomplished this by their own acts of citizenship.

In the Sherman Act the word "person" is used all the way through; but Section 8 tells us that, "the word person or persons, wherever used in this Act, shall be deemed to include corporations and associations." This is a considerable enlargement of the dictionary definition. The Sherman Act amends Noah Webster and a good many other folks. A person may or may not be a voter. A corporation can't vote, and occasionally has difficulty in getting votes. Both are alike citizens. The railway company is domiciled in each community it serves, and has plain duties of citizenship enlarged in full proportion to the size of its interests in those communities.

In this attitude of corporate citizenship I hope we have passed through two phases, and that we are entering upon a third and last one. The last is to be somewhat like the first, but a great improvement on it; the middle one was outrageous.

The pioneer promoter of railway building was always a great man. He built roads in barren lands and coaxed people to come in and make them bloom. His work lived after him, although he usually busted up.

Here is a sample of many cases: The promoter built a city on his line, largely of architect's plans. His materials of construction were those used for castles in the air. He established banks, water and gas companies and Y. M. C. A. associations. At the inevitable meeting of his creditors, he made a tearful speech: "I surrender to you everything that I possess (the rest was in his wife's name). If it will better the situation, divide my body among you." An unfeeling creditor said, "Then put me down for his gall."

Note one fact about this period seriously. The State did not make or much regulate the early railways. The railways then made the State, and are now continuing to make the existence of the State possible.

There was a middle period or phase when the railways were haughty, domineering, mysterious. This has been changed by methods comparable to the American Revolution, or the civil war; indiscriminate attacks, just and unjust, hostility to everything that bore the name of company or corporation. It has been brutal, but it has been effective. I sincerely believe that the railways, as a whole, are now more exactly law-abiding and, as citizens, are more helpful than any other class of persons. They are more helpful when they do their full duty, simply because they are bigger citizens.

In the southerly corner of California there is a valley of nearly a million acres as fertile as any in the world. It is irrigated by a canal from the Colorado River, built by the California Development Company. The Colorado is a great flood river; it is powerful and mischievous. Four years ago it tore through the canal and, instead of quietly keeping on its way to the Gulf of Mexico, it began to make the Salton Sea, in the Imperial Valley of California. The development company could not stop it without help and the Southern Pacific Company loaned them about a million and a half dollars to do it. But the Colorado River was ingenious, fiendish in its successive breaks, and seemed to be hell bent on abandoning its Mexican direction and fighting its way northerly. It broke through again and again in the light alluvial soil, each time at places nearer and nearer to the Mexican boundary. At these points the river is the Arizona-California State boundary, and the last break was close to the Mexican line. It was an interstate and was becoming an international incident when a flood without precedent tore an opening ½ mile wide and 34 feet deep, through which the Colorado went at 4½ miles an hour, to the doomed Imperial Valley.

The Southern Pacific had a branch, not a main, line in this valley. The company was simply one of its 10,000 citizens with possibly less at stake than some of the others. The responsibility for stopping the break was probably on the United States Reclamation Service, but the company had the facilities for immediate action and did not hesitate a moment. It did not hesitate although the demand of the President of the United States for action was irascible. All the cars and men for which there was room were put to work. The crevasse was closed in 15 days, and the closure was made permanent by half a mile of dam and 15 miles of levee. The cost of it all was $3,150,000, paid by the Southern Pacific Company and never refunded to it. It was greater than the whole cost of the company's branch line in the valley. The Southern Pacific proved its citizenship.

Mr. Harriman ("Is Saul also among the prophets") was in other ways a most enlightened believer in the citizenship responsibilities of his companies. They are carrying on in the great west a form of partnership with the business associations—state, county and city—by means of which enterprising men and educated young men the world over have correct information of the possibilities of the west, and these companies are peopling that great region with desirable citizens. The idea of a railway president, that he is a man of no principles and few prejudices, is coming to be considered an exaggeration. Indeed, we might say in Irish, "Half the lies told about him ain't true."

On August 3, 1898, just after the Spanish War, the Long Island Railroad was notified that a convalescent camp for the Fifth Army Corps would be established on the dunes, near Montauk Light, on the east end of Long Island, and that the cavalry regiments would arrive with their horses in Long Island City within three days. It was indeed fortunate that this poor, light, single-track road had as president a great citizen, William F. Baldwin, who has since died in his prime.

He called his staff together and talked to them: "We are facing a tragedy. 25,000 men and all that they need must be carried at once over 116 miles of single

track to a terminal where nobody lives and where there is now only a ticket office and a 10-car siding. We haven't the engines, the cars or the terminal yard at Montauk for handling them; it looks impossible, but we must do it. We must spend ourselves; and he quoted reverently "whosoever would save his life shall lose it."

They did not spare themselves, these citizens, and when, on the second day, the army came, they moved it. In less than a week they had built at Montauk a four-mile distributing yard, unloading platforms for animals and wagons, cooking and sleeping houses for the railway employees, two large freight houses, a water supply and all the necessary equipment for a busy terminal.

The little railway hauled in its own materials and all that was wanted for the new government storehouses, general hospital and detention camp. It moved 35,000 officers and men, 8,750 horses and mules, with their belongings, daily food and other needs. For a few weeks this little road was the busiest line in the world; then the army folded its tents, like the Arab, and as silently stole away.

There are many less spectacular instances in the development of citizenship. Self-sacrifice and free gifts are not long remembered. Broad-minded selfishness is the most interesting phase of corporate management. When L. F. Loree became general manager of the Pennsylvania Lines West of Pittsburgh, he found the trains, the right of way and the yards infested by vagrants and tramps. They rode on the trucks and blind ends of postal and express cars. They got killed, had to be buried, and pretty often their lives or legs had to be paid for. They stole from the cars and stations and from the residents. They caused fires and had an insane bent for petty crimes. The vagrant laws varied widely through Indiana and Ohio, but this was unimportant while they were not enforced.

Loree employed Josiah Flynt, the literary hobo. He spent weeks on the line, disguised as a tramp, and made a fine report on the damage, the cause and the cure. For the cure there were only three words—enforce the law. This needed co-operation between the railway and the municipal authorities. Loree finally got splendid co-operation. Either personally or through members of his staff, he met and had it out with all the municipalities on his line. His general proposition was: We are your fellow citizens. We will arrest and bring in every tramp in the region, if you will enforce the law. They all accepted it. He formed an unusually sturdy police force, and for a few weeks they had the time of their lives. It was team work, and they made tackles and touch-downs less gently than the football teams, until suddenly in all that region the tramp became as extinct as the buffalo on the western plains.

There is another kind of citizenship, that is, railway undertakings to make their fellow citizens well-to-do. You may call this patriotism, or enlightened selfishness, but one of these terms may be a definition of the other one.

Mr. Delano, on his lines in Missouri, is showing the man from Missouri; he is spending money and time in encouraging the study of agriculture along his lines.

Mr. Brown, of the New York Central, has citizenship in nine States and is buying quarter-section farms in each of them to be used by the State as experiment and

demonstration farms. Being a farmer himself, he knows that the productiveness of land can be largely increased, and at a large profit.

Mr. Peters, of the Long Island road, has already nearly doubled the money value of Long Island garden truck by his two experiment gardens and his fortnightly bulletin of results. He has taught his neighbors how to make money.

By personal intercourse with his company's fellow citizens on the Southern Railway, Mr. Finley has converted one of the worst possible situations to one of the best situations. He has been patient under the hostilities, long enduring with fanaticism, law-abiding but firm and skilful in getting true interpretations of the law. "The law is good if a man use it lawfully." This is what St. Paul wrote to Timothy, but Finley has also read, out of the tail of his eye, another remark by St. Paul: "Law is not made for the righteous man, but for the lawless and unruly; for the ungodly and sinners." His ungodly neighbors now know he read that. He has been kindly as well as firm to his neighbors and is surely well on the way to making their region and his company highly prosperous.

Looking back over the period since the last general election, I think the railway officers were then right in believing that the jam is broken. We get a line on public opinion largely from the newspapers, partly from the action of the legislatures and commissions and negatively from the demagogues. The man who has observed but a few facts can make up his mind with great definiteness. A careless or ignorant paragraph in his newspaper may establish for life the commonplace man's opinion about railway corporations. Nevertheless, in the long run, public opinion is about right. From the storm of bitter hostilities the railways are coming to reasonably good weather. Under the leadership of great men they have substituted frankness with the public for mystery, a neighborly attitude instead of hostility, and successful overtures for cooperation with the towns, cities, counties and States in which they are powerful citizens.

It is true that the railways are creatures of the state, but I will repeat once more, the railways have made the state. They will get justice from their fellow citizens for two reasons—because we are a just people, and because we cannot get the highest measure of prosperity unless they are so highly prosperous as to serve us well.

Thank you, Mr. President. [Applause.]

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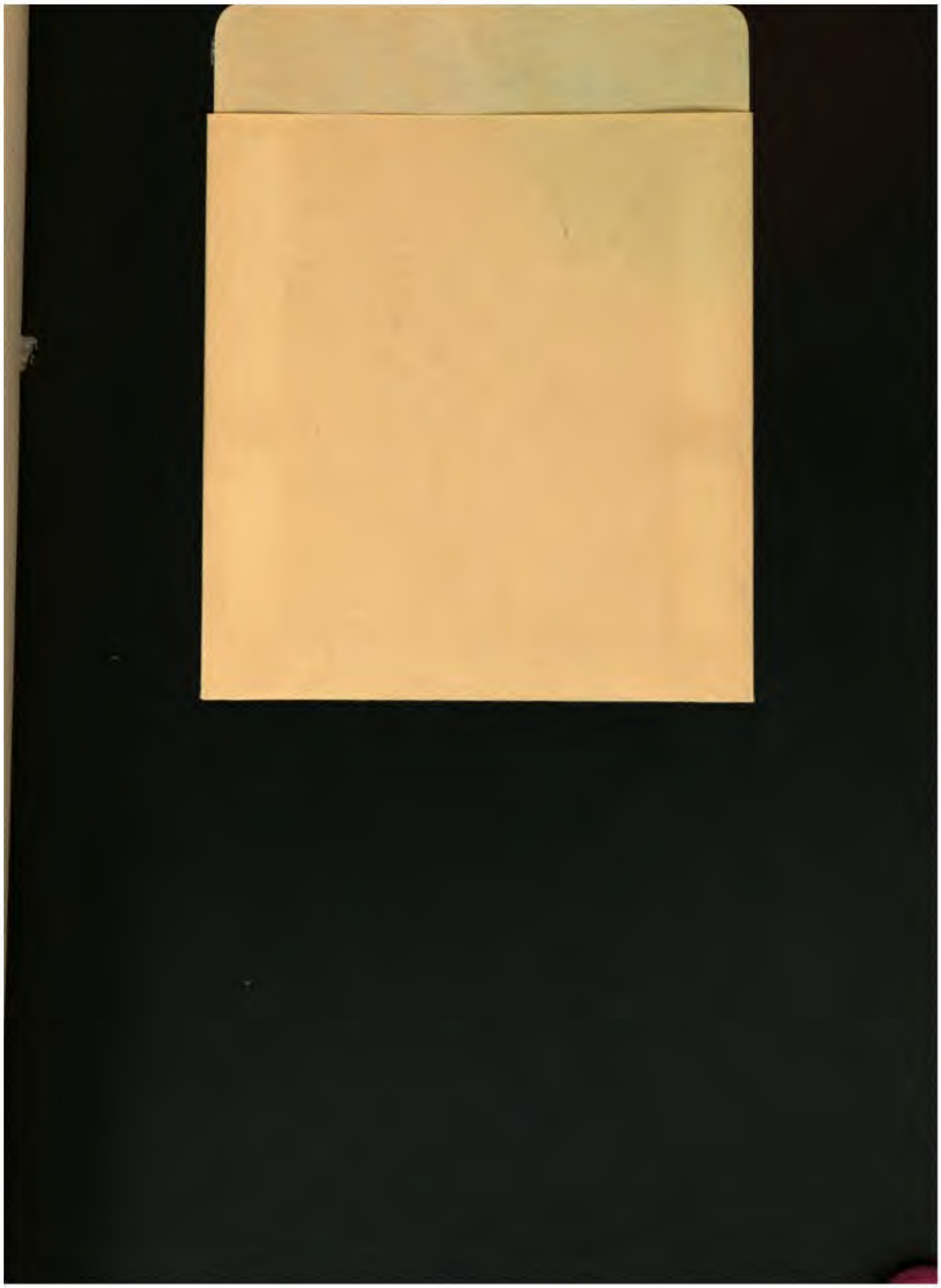

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